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THE LONG-AWAITED REPORT ON UFOs by Professor Edward U. Condon's investigating committee at the University of Colorado, seems to have hit the nation with all the impact of a goose down pillow. Except for the *New York Times* — which printed the committee's report verbatim (as is its wont in reporting such matters of record) — almost no one except the "true believers" gave it more than passing attention.

This is too bad. Dr. Condon and his investigators did a terrific job of running down and evaluating, on a hard-minded level, every report, every shred of evidence and every statement regarding alleged UFO

THIS MONTH

sightings — including unexplained radar reflections. Their conclusions — a surprise to few if any in the scientific fraternity — state emphatically that there is absolutely no evidence to support concrete belief that our planet is being visited or reconnoitered by voyagers from elsewhere.

The reason it's "too bad" is because the "true believers," who have been following the situation, already have a book in print aimed at tearing the committee's report to shreds. In short, the "buffs" are up in arms over the exposition of hard, cold facts.

There's little doubt that the scientific fraternity already has shed itself of any further preoccupation with the subject of UFOs. It is off on the more immediate and important problems of a complex world.

But we predict that the astute Condon report may well work in reverse, and produce a noisier UFO rumble from the opposition than any racket that they have raised on the intriguing subject to date. — RFD

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DIGEST®

Why did giant dinosaurs that had ruled the earth for 100 million years suddenly disappear 70 million years ago? The mysterious mass deaths of the great reptiles have long been a puzzle to paleontologists. For an intriguing look at the old theories and a new one—cosmic radiation—turn to page 45.

Cover photo courtesy Disneyland Productions.



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NEWS IN BRIEF

Bulletins at press time

WE ARE NOW IN A POSITION TO ADD 20 YEARS OF HEALTH to the lives of many -- if not most -- people, according to a report in Los Angeles magazine covering a debate at UCLA's medical center about a new procaine "youth pill." Dr. Herbert S. Kupperman, of New York University medical center, discussing the "pill" (known as KH3), stated flatly: "I definitely foresee widespread use of the so-called "youth pill." While no one knows why the procaine pill works, reports of hard medical evidence that it does work have created a sensation in Rumania, Germany and England. Says the report: "There is a strong probability -- many experts believe it a virtual certainty -- that it will soon become as widely used in California as penicillin."

RUSSIA LEADS THE SPACE STATION RACE, according to the Soviet government's announcement after the return of their two spacecraft Soyuz 4 and 5. Some experts agree that Russia may indeed lead in one aspect of the conquest of space -- the building and orbiting of large-scale space stations. The American and Soviet space programs have taken essentially two different directions: The U.S. is concentrating on putting a man on the moon by 1970, possibly even by mid-July of this year. The Russian goal, however, is to set up experimental space stations from which space exploration and study can be conducted. When our first astronauts set foot on the moon, the Soviets may be working in an orbiting space laboratory.

BIRTH CONTROL IS CHANGING THE MORES OF SWEDEN, according to the conclusion of a study group ordered by the Swedish Royal Commission on Sex Education. Headed by sociologist Hans L. Zetterberg of Ohio State University, the group noted that 98 percent of the married population of Sweden had premarital sex relations. The study also reported that every tenth child is born out of wedlock and that sex education in the schools seemed to have little effect on basic morality. Results of the study were obtained by interviewing almost 2000 Swedes.

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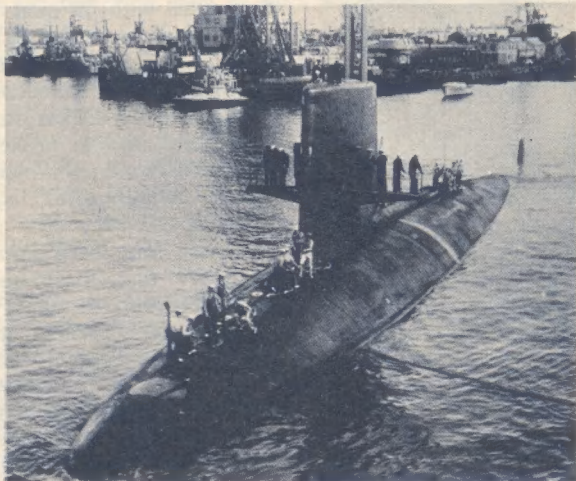
FAST-FLASHING STAR MAY BE A PULSAR, if three astronomers at the University of Arizona are right. Drs. W. John Cocke, Michael J. Disney and Donald J. Taylor have spotted a star that flashes in rhythm with a pulsar located in the same spot in the universe. Pulsars were first suspected of being controlled beacons transmitted by some remote civilization in distant space. They are now thought to be caused by the explosion of a burned-out star or supernova. Both the pulsars and the flashes are thought to be linked with the star's extremely fast spin -- 30 times per second.

THE CHRONIC EFFECTS OF MARIJUANA, on the individual as well as the society, were scorned recently by international narcotics experts in Geneva, Switzerland. The seven-member Committee on Dependence-producing Drugs, organized by the World Health Organization (WHO), strongly reaffirmed earlier findings of the United States Health Agency that marijuana is a "drug of dependence, producing health and social problems, and that its control must be continued." Dr. Dale C. Cameron, head of WHO's narcotics unit, commented that the pleasure of the use of marijuana tends to cause a preoccupation with the drug. The dependence is psychic rather than physical.

UNDERPRIVILEGED CHILDREN'S I.Q.'S CAN BE RAISED, if the results of a study conducted by the National Institute for Mental Health are correct. Tutoring infants regularly seems to raise dramatically their intelligence quotient scores. In experiments conducted in cooperation with Catholic University, 64 fifteen-month-old boys of the Washington, D.C. area were divided into two equal groups. One group received an hour of tutoring each week day; the other group did not. After 21 months the tutored group had an average intelligence quotient score of 106; the untutored group had an average of 89.

"POT HOUNDS" ARE NOW USED TO SNIFF OUT MARIJUANA hidden in pockets and gear of GI's in Vietnam. The specially trained dogs have done such a good job that the Department of Defense has expanded a pilot program, according to Air Force Times, to establish a regular unit of "narcoticsagent" dogs. The pot-smelling pups will be put to work among all troops on regular duty, but big emphasis will be among front line troops in order to halt smuggling of drugs into Hong Kong and Australia and to stem their use by our fighting men.

Storms that rage beneath the sea



U.P.I.

Nuclear submarine *U.S.S. Scorpion*, shown here during visit to England, was lost near the Azores last May with 99 men aboard. Was it caught in a current from some forceful underwater disturbance?

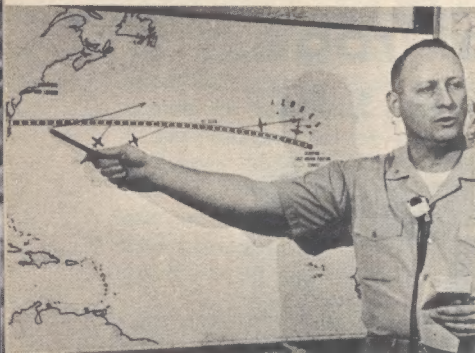
Scientists are examining startling evidence of violent "weather fronts," maelstroms, vertical currents that storm through sea depths. Sunken submarines may have been victims.

by William Perkinson

UNTIL RECENTLY the depths of the sea were thought to be a "calm, weatherless place" just as the stratosphere above the earth was thought to be "above the weather" before pressurized jet planes encountered "clear air turbulence" ten and more miles high.

Today, however, the United States Naval Oceanographic Office is ready

to recommend that the Navy send a manned, nuclear-powered, fleet-type submarine on an exploratory mission that would put the craft "right under, and directly beneath, a hurricane or typhoon," according to that office's Capt. T. K. Treadwell. Chief purpose of the mission would be to obtain factual data on what appears to be unusual, violent and hazardous storms that seem to rage deep beneath the surface of the sea.



Top photo U.P.I.

Navy commander points to location of *Scorpion's* signals 110 miles from Norfolk and areas of plane search. Last known position of the sub was at end of heavy black line. Below is photo of bottom of ocean, 10,000 feet down, where Navy Research ship *Mizar* found portions of sub's hull.

Relatively new scientific evidence indicates that the depths of the sea are not the placid regions we once supposed. Scientists now suspect, says Treadwell, "that the weather beneath the ocean is as complicated and dynamic as the weather above it."

There is also serious speculation among professional oceanographers that storms beneath the sea may have contributed to the loss of at least four modern submarines flying the flags of three western nations during the past five years. Those disasters,

which cost 349 lives, include:

- The nuclear-powered U.S.S. *Thresher*—with 129 men aboard—lost off New England in April 1963.
- The Israeli submarine *Dakar*—lost in the Eastern Mediterranean last April with 69 men aboard.
- The French submarine *Minerve* lost in the Western Mediterranean—with 52 men aboard—just two days after the *Dakar* vanished.
- The nuclear-powered U.S.S. *Scorpion*—with 99 men aboard—lost "near the Azores" in the Western Atlantic last May.

It has long been known to submariners that local undersea turbulence occurs in many well-defined and widely separated areas of the world. Only in recent years, however, has it been suspected that "underwater weather fronts" may move not only through the deep oceans but also through the shallow depths.

There is also evidence of what are called "internal waves" in the depths of the ocean. These waves, Capt. Treadwell explains, "are still very little understood. They seem to act like long swells beneath the sea, and have amplitudes, or heights, that could be measured in tens or hundreds of feet."

To visualize how such waves might affect submarine performance, you need to know a little bit about how a submarine operates.

A submerged submarine compresses—like a squeezed sponge ball—as it goes deeper into the ocean. As its size is reduced, the craft grows more dense and hence has a tendency to sink faster the deeper it goes.

As Treadwell describes it, "There is only one thing a submarine com-

Condensed with permission from an article series. © 1968 The Baltimore Sun.

mander can do when he is in trouble. Blow ballast.

"If it's a shallow dive, that's easy. You can blow ballast so fast you pop out of the water like a cork. Of course, it's not recommended that you come up that fast, but in an emergency it can be done.

"In deeper water, however, you may be in trouble. It takes time to build up the pressure to blow the ballast. At some depths you may be only shifting from one pressure tank to another while building up the pressure needed to blow. During the time pressure builds, you are going down."

Thus, he says, it is possible that if an internal wave hundreds of feet high passed over a submarine operating near its "critical depth," the added pressure from the internal wave might compress the submarine and cause it to sink faster than a commander could adjust ballast, and the submarine would be carried below its collapse depth.

At collapse depth (usually below 2,000 feet) the pressure of the sea is so great that objects normally considered to be "upward floating," or positively buoyant, are squeezed so tightly they lose all the air entrapped in them, and literally become heavier than water and sink to the bottom.

A recent publication of the United States Naval Oceanographic Office notes, for example:

"The pressure at the deepest part of the ocean is close to seven tons per square inch, almost 1,000 times the atmospheric pressure on the earth's surface. At a depth of 3,000 feet, a pressure of 8,100 pounds (about four tons) per square inch is sufficient to squeeze a block of wood to half its volume so that it will sink (instead of float to the surface). At

a depth of 20,000 feet, air will be compressed so much that it will weigh as much as the surrounding water."

While there is still no general theory of what causes "internal waves" and other kinds of storms beneath the sea, some oceanographers have expressed the view that underwater disturbances, generated by either the Sicilian earthquakes or mud slides associated with those earthquakes, may have caused the loss of both the *Dakar* and the *Minerve*, even though they were more than 1,000 miles apart in the Mediterranean. Both craft were operating near or above two of the most rugged parts of the Mediterranean Sea floor.

Unpredictable waters

The *Minerve*, according to published reports, was southeast of Toulon, near where the shallow waters of what is called "the Rhone fan" suddenly drop off the continental shelf and mix with the 6,000 to 8,000 feet of water that covers the abyssal plain of the Balearic Sea.

Oceanographers say that even though some of the canyons carved through the Rhone fan are among the most thoroughly studied in the world, there is still no way of predicting when "turbidity currents," or mudslides, will race down those canyons like an avalanche down a mountain slope, sweeping away or burying anything in their path.

It was just such a slide some years ago off the coast of New England that parted seven transatlantic cables along an area from New York to Portland, Maine. And it happened in minutes.

There has been some speculation that the *Minerve* may have been the

victim of an underwater subsidence caused by the after-quakes resulting from the disastrous earthquakes that rocked Sicily, causing hundreds of deaths, in mid-January, 1968. A subsidence—or a sinking of parts of the ocean floor—might create a suction-like effect that could have pulled the *Minerve* down to a depth where her hull was crushed and she and her crew were lost for good.

According to published reports, the *Dakar* vanished while sending an unscheduled radio message to Haifa as the craft cruised beneath the Mediterranean about 125 miles southwest of Cyprus. That would place the *Dakar* in the Ionian Sea, which contains the rugged Hellenic trough, some 15,000 feet deep, as well as the chain of undersea mountains known as the Mediterranean Ridge, and the canyon-carved slopes of the shallow Nile Cone centered off the entrance to the Suez Canal.

'Sill' storm changes form

While the possibility that the *Dakar* was sunk by Egyptian ships cannot be ruled out completely, the probabilities are that the Israeli craft was caught in an underwater storm and carried downward until she was crushed like the *Minerve*.

Another kind of underwater storm has been offered as a possible reason for the loss of the *Thresher*. There is an underwater maelstrom generally known as a "sill" storm that occurs in different forms in different parts of the world.

In the case of the *Thresher*, one theory is that a sudden surge of cold Arctic water spilled over the relatively shallow Labrador shelf and down the continental slope. This sudden surge of dense, cold water

may well have created a whirlpool that carried the submarine below her crush depth.

It is also possible, according to Capt. Treadwell, that the *Scorpion* was caught in a current associated with an underwater disturbance near the Azores, but that is pure conjecture at this point, he adds.

Captain Treadwell knows from personal experience that underwater turbulence does exist where surface currents flow in one direction and underwater currents flow in another. He encountered such turbulence aboard a submarine off Formosa. The disturbance is not as severe as that encountered in aircraft entering the jet stream (a similar effect), he explains, "because the submarine being heavier doesn't bounce around as much. But the turbulence does make it harder to control both depth and heading."

Dr. Richard James, head of the forecast section of the Oceanographic office, has outlined some of the areas of the world where "local" changes in underwater weather may be hazardous to submarines:

- There is a tendency for submarines to sink or bob upward at the boundary between the Gulf Stream and the Labrador current, depending on which way they are going. The Labrador current is more dense, and colder, than the Gulf Stream.

- The entrance to the Mediterranean off the Straits of Gibraltar can be dangerous. Under certain weather conditions the heavier and saltier water of the Mediterranean moves out to the Atlantic and spills over the narrow sill separating the seas. At other times the lighter, more buoyant water of the Atlantic moves over the sill into the Mediterranean. The result is that a submarine can

Navy Oceanographic Office wants to put nuclear subs beneath surface of hurricane to learn what goes on.

either be thrown surfaceward or pushed downward, depending upon the state of the water. A number of German submarines are believed to have been lost due to this effect in World War II.

• In the Arctic Ocean, particularly when the ice is melting or almost melting, a shallow layer of very cold, fresh water often forms. "If a submarine is coming up nicely from a layer of dense saline water," says James, "and hits that shallow layer unexpectedly, the craft will pop out of the water much faster and much harder than you would expect."

For those persons who like numbers, one Navy publication illustrates the importance to submarine operations of sudden changes in the density and saltiness of ocean water in these words:

"A change in density of one part in 1,000 changes the buoyancy of a fleet type submarine by as much as 5,400 pounds. A change in salinity of one part in 1,000 changes the buoyancy by 4,200 pounds."

That means in either case, the submarine commander would have to dump or take on more than two tons of ballast immediately if he wanted to maintain his depth beneath the surface of the sea.

If both the density and salinity changed at the same rates noted above, the amount of ballast to be shifted, of course, would be more than four tons.

Regarding the subsurface waves that seem to move through the deep oceans, Dr. James confesses that no one knows what causes them. But theories run from earthquakes to

turbidity currents that may pour down continental slopes at speeds of 60 or more miles an hour.

One possible new clue to a source of internal waves, both Dr. James and Captain Treadwell note, was uncovered just last summer by Lt. Eric Schneider, of the United States Oceanographic Office. He was on an oceanographic ship en route to Bermuda when Hurricane Dolly went rampaging. To avoid the storm, the ship slipped behind Dolly, taking routine oceanographic measurements as it went along.

The surprising thing was that when the ship crossed the track of the hurricane there was a sudden increase in the salinity and a sharp decrease in the temperature of the water.

Preliminary studies of the phenomenon seem to indicate that hurricanes create a suction on the surface of the sea that literally lifts dense, cold water to the sea surface. The discovery was totally unexpected, according to the Navy Oceanographic Office. Significantly, if hurricanes lift cold, dense water to the surface it must necessarily sink downward again and perhaps produces a slow pumping action on the ocean until it reaches its own level.

Such pumping action could continue for some time and produce "internal waves" hundreds of thousands of miles away from the hurricane track itself. That's the reason why the Navy Oceanographic Office wants to put a nuclear sub right under a hurricane. What happens to it beneath the surface will add to our growing body of knowledge about stormy weather under the waves.

New whale for an old fish hall

THE MOST POPULAR exhibition at the American Museum of Natural History in New York City is about to be "broken up and swept away." Since 1908, the favorite of tots and adults alike has been the big blue whale. This 76-foot, plaster replica has been replaced with an enormous 94-foot, 21,000-pound whale made of polyurethane foam and fiberglass.

The new whale took about 2½ years to construct and cost better than \$200,000. It is on display in the museum's Hall of Ocean Life.

Just getting the huge sculpture into place was a long, dangerous process that was visibly unnerving to the workmen involved — even though they were hired for the job because they build skyscrapers.

They raised the whale 52 feet above the marble floor of the museum by chain hoists in two sections: first the 66-foot front part, then the 28-foot rear section.

Part of the problem in putting it in place was caused by its method of suspension from the ceiling. A single steel pipe supports the whole 10 tons.



This pipe extends from above the reinforced ceiling through a point just in front of its dorsal fin. The whale is shown sounding or diving into the water after surfacing.

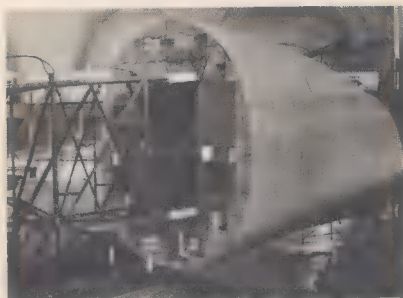
For a length of ten inches, the whale seems to disappear into a cornice on the ceiling, and creates the impression of floating.

New whale's eye and ventral grooves are clearly visible below. The whale is being covered patch by patch with fiberglass. First it was coated with polyester resin to bind the fiberglass securely to a polyurethane under layer.



All photos the American Museum of Natural History

Weighing 21,000 pounds and costing \$200,000, the whale is suspended 52 feet above the floor of the Hall of Ocean Life. Front section of the whale is being hoisted (above) by workmen hired because they build skyscrapers.



Inner core of the new whale (above) shows blocks of polyurethane which are fitted individually over an enormous framework of steel.

As the pieces of polyurethane foam arrived from the manufacturer, Barton Plastics, Inc., they were fitted together like a huge puzzle.





MD's without education— how to spot them

In the 1600s medical quacks used to bleed their patients or give them transfusions with lamb's blood as above. Today's impostors still use the bleeding technique, but it's our pocketbooks that are becoming so anemic.

by Robert C. Derbyshire, M.D.

LET ME tell you a true story. Freddie Brant was born 43 years ago in Louisiana. Reared in poverty, his formal education ended with the fifth grade. During World War II, he was in the army for four years. After dis-

charge he found that jobs were scarce for a man with only a fifth grade education so he joined the paratroops. In 1949, along with a fellow paratrooper he was sentenced to seven years in the penitentiary for bank robbery. There he worked in the prison hospital.

When he was released, he learned more about medicine by working as a laboratory and X ray technician for Dr. Reid L. Brown of Chattanooga, Tennessee. After four years on the job, Freddie decided he was now ready to begin the practice of medicine so he stole copies of his employer's diplomas. Assuming the identity of Dr. Reid L. Brown, he moved to Texas where he obtained, by endorsement, a license to practice medicine.

After serving for three years on the staff of the State Hospital at Terrell, he then resigned and took his wife on a vacation trip. Stopping in the small village of Groveton, Texas, he treated the injured leg of a child. He found that Groveton had long been without a doctor and the people were clamoring for medical care. "Dr. Brown" soon became established as the town physician and as a community leader.

The medical career of Freddie Brant, alias Reid L. Brown, M.D., was cut short, however, when a computer spotted him as a fraud. By coincidence he ordered drugs from the same pharmaceutical firm in New Orleans patronized by the real Dr. Reid Brown. The computer gagged when it discovered orders on the same day from physicians with identical names in different cities.

The exposure of Freddie Brant caused consternation in Groveton. But the citizens rallied around their "doctor." According to one news report, the list of his patients included some of the leading citizens, as well as farmers, loggers, and welfare patients. The druggist said that many cases of hardship were caused by the arrest of Freddie. A particularly glowing testimonial came from a farmer who said, "My wife has been

sick for 14 years. We've been to doctors in Lufkin, Crockett, and Trinity and he did her more good than any of 'em. She was all drawn up, bent over, you ought to have seen her. He's brought her up and now she's milking cows and everything."

The citizens of Groveton remained loyal to Brant. A grand jury refused to indict him. Authorities then brought him to trial in another county for perjury but the case ended in a hung jury with eight members for acquittal.

What were the secrets of Freddie Brant's success as an impersonator? They were many, but the main ones were his readiness to refer any potentially complicated cases to nearby towns, a personality which inspired confidence, and a willingness to take time to listen to his patients.

Freddie Brant is only one of many medical impostors whose records are on file in the Department of Investigation of the American Medical Association.

What is the typical successful impostor like? His medical background might consist of a tour of duty as ■ medical corpsman in the Army or as a pharmacist's mate in the Navy. He might have served as a hospital orderly or as a laboratory technician. Some obtain their medical educations as patients in mental hospitals. The sole medical background of one was service as an elevator operator in a hospital. From his associations with physicians the impostor acquires ■ smattering of medical jargon sufficient to fool the unwary. But our im-

Reprinted with permission from a paper by Robert C. Derbyshire, M.D., delivered at the A.M.A.-sponsored National Congress on Health Quackery, Chicago, Ill., Oct., 1968. Dr. Derbyshire is on the State of New Mexico's Board of Medical Examiners.

State hospitals seem to be the easiest places for impostors to get started.

postor must have other attributes in addition to facility in enlarging his vocabulary; the most important of these are a good memory and a persuasive manner.

State hospitals, particularly in recent years, have provided an entree into fraudulent medical practice. I found six such cases in the last ten years. One of the most interesting is that of a person without medical background who was employed as superintendent of a state hospital. His credentials were based solely upon a diploma stolen from a Dr. Menendez, a graduate of the University of Havana Medical School. This man might have enjoyed a long and profitable career as a hospital administrator. But he resigned after nine months and moved to another region where he obtained a position as staff psychiatrist in a state hospital mainly on the basis of his recommendations from the first state. However, his second career ended abruptly when his new colleagues became suspicious because of his manner and exposed him.

The director of the Department of Health in the state in which he was first employed, whose duty it was to pass upon the credentials of this impostor, said that the state hospital was hiring some recognized foreign doctors on a temporary basis. Obviously his examination of these credentials was entirely superficial. But there are often extenuating circumstances, all too familiar to members of boards of medical examiners.

First, there is a concerted effort among certain groups in this country

to resettle foreign physicians, particularly those who are thought to be fugitives from communism; secondly, there is a universal shortage of qualified applicants for staff positions in state hospitals so that the standards are deliberately lowered to permit physicians unqualified for regular licenses to fill them. Thirdly, highly placed politicians often intercede for them. These three factors combine to place such pressure on boards of medical examiners that it is only remarkable that they resist as effectively as they do.

State requirements

In many states applicants for positions are not required to be screened by the boards of medical examiners. Where licenses are not required, special permits to practice only in the hospitals are granted. Some states have no requirements. Where the hospital authorities are the sole judges of credentials, they have neither the facilities nor the inclination to carry out adequate investigations.

How are impostors exposed? Obviously those whose medical careers last only a few months are so inept that they give themselves away. But exposure of the experts has proven difficult and frequently happens only by accident. Several have allowed their greed to get the better of them and have tried to supplement their incomes from medical practice by various confidence games. As far as I know, Freddie Brant is the only one who has been exposed by the computer.

Most states consider medical frauds merely as petty criminals, guilty of misdemeanors.

A surprising discovery is the fact that few impostors have credentials either in the form of medical school diplomas or state medical licenses. Detailed examination of the records of 30 successful impostors revealed that only eight had bothered to obtain credentials either by forgery or theft. Such oversight is amazing as I found that there is a firm in California which specializes in producing phony documents. At least one impostor was familiar with this company as he not only ordered complete medical credentials but also turned himself into an author. He removed the pages from a book and had them rebound with his name on the cover. His fatal mistake was in failing to realize that he might be called upon by a colleague to discuss the contents.

The gullibility of the public, both medical and non-medical, is what amazes me—also the readiness of bankers, whom I have always regarded as paragons of caution, to lend money to impostors to help them start their medical practices. Also fair game are the citizens of many small towns with desperate shortages of doctors who will lionize any presentable individual who claims to be a physician.

The charm and persuasive powers of the successful quack in any field are considerable; however, I am amazed at the failure of responsible citizens to question his credentials.

Another curious phenomenon is the reaction of the public after the exposure of the impostor. Many people staunchly defend him and are

grievously hurt because the authorities have removed their trusted family physician. Typical is the case of the fraud who successfully practiced in a small town in a populous state for some six years. His following of devoted patients was large. He even won the esteem of his colleagues who frequently called upon him for consultations. When he was finally exposed by agents of the State Board of Medical Examiners, the anguished outcries of his devoted followers could be heard all the way across the Hudson River. Nevertheless he was brought to justice and convicted of fraud.

Another difficulty with the exposure of medical impostors stems from the indifference of the district attorneys. I have had personal experience with this and from my conversations with other members of boards of medical examiners I have learned that my problem is not unique. Apparently these law enforcers are not enthusiastic about pursuing people whom they regard as petty criminals, for this is just what impostors are in many states. In only four states, Florida, Kentucky, New Mexico, and Rhode Island, is the practice of medicine without a license defined as a felony. In the other 46 it is a misdemeanor. I remember one instance in which my board of medical examiners discovered a man who was practicing medicine without a license, but the district attorney showed no interest in prosecuting him. It was not until some two years later, after the im-

The Department of Investigation of the AMA is the best place to check on a suspected fraud.

postor had been responsible for the death of a patient, that the state police arrested him on a charge of manslaughter for which he was convicted and sentenced to five years in prison.

What motivates these people to impersonate doctors? While it is true that some yearn for the imagined rich and easy life of the doctor, this is not the only answer. Some envy the authority and social position of the doctor. Others are mentally deranged, many having served terms in mental hospitals. Freddie Brant simply said, "I always wanted to be a doctor."

Prevention best cure

Obviously, as in disease, the best cure for impostors is prevention. It should be primarily the duty of the boards of medical examiners to see that all who seek to practice medicine in their state are qualified. One way to accomplish this is the use of the personal interview. Although opinions differ in regard to the value of the interview, an experienced person should be able to learn much by observing a candidate, and he can train himself to recognize certain danger signals.

Another method of detecting impostors is the requirement that all applicants for licensure be fingerprinted. Many boards of medical examiners are reluctant to require this as they feel that the professional man should not be embarrassed by such an indignity. At present only

seven boards require fingerprinting. But this is not as drastic a requirement as many think and most applicants submit to it with good grace.

Without a doubt the most authoritative source of information concerning physicians is the Department of Investigation of the American Medical Association. In its files are kept the complete biographical records of all physicians from the time they first enter medical school until they die. If they drop out of school, this also is noted. After graduation, up to date records are kept of internships, residencies, types and places of practice, and of any difficulties physicians might have with the law, their boards of medical examiners and medical societies.

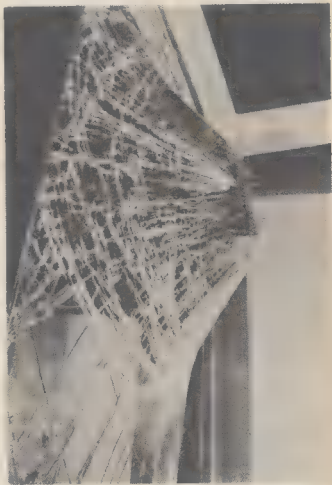
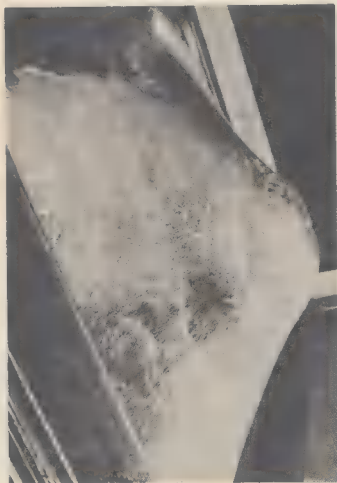
Records of graduates of foreign medical schools who come to this country are also kept. Furthermore, the Department of Investigation is able to conduct a complete search at the request of a hospital, board of medical examiners, or a medical society to determine whether or not a person really is a physician.

If responsible agencies such as boards of medical examiners, hospital staffs, and medical societies take all possible precautions, only rarely will a medical impostor slip by them. But no system can be infallible; and, because of man's never-ending quest for a state of complete physical well being, the occasional glib charlatan, once he evades the authorities, is likely to survive. In this event it is the job of all concerned to make his survival time as short as possible.

Shattered glass that can't cut

TWO GLASS MANUFACTURERS have simultaneously come up with similar answers to the same serious problem—how to cut down on the number of serious injuries and deaths caused by shattered windshield glass. The Glaverbel Company of Brussels, Belgium, and Corning Glass Works of Corning, N. Y., are both about to market windshields that if broken shatter into tiny granules that do not cut (bottom right picture).

The two top pictures show the difference in breakage patterns of the new windshield (left) and the ordinary glass when struck by a heavy object in much the same way as auto accidents involving facial injury to passengers. Also, there is much more flexibility due to Corning's inner pane of chemically-strengthened glass (bottom left). American Motors will begin using these windshields in 1970.



BIPS



NEW FOR PEOPLE

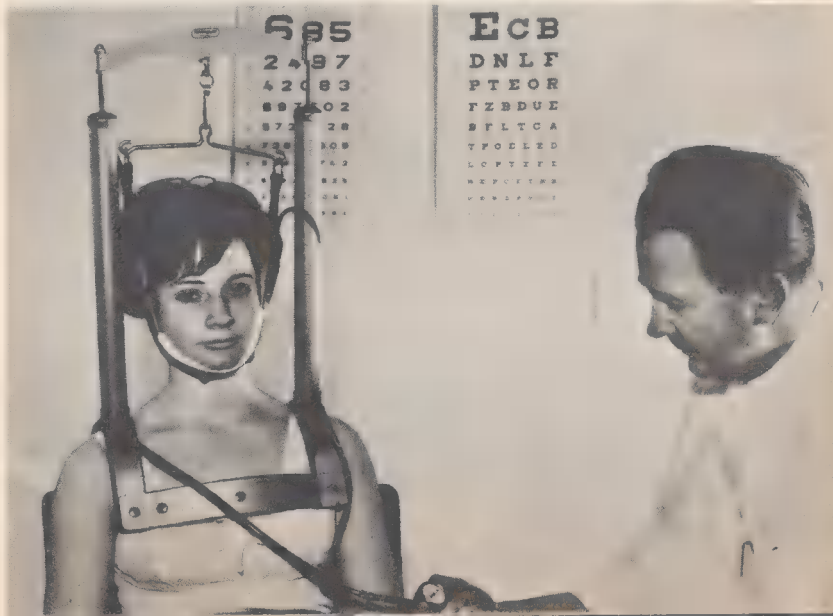


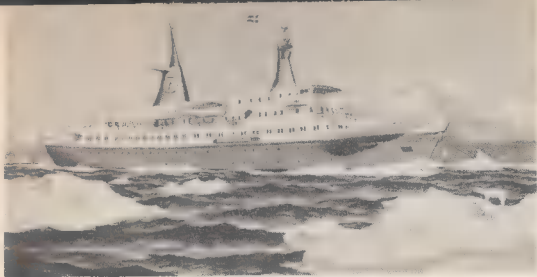
Pictorial Parade

Giant can opener for rescuing victims in car smashes has been invented by Australian Ben Ludlow. Easy and quick to operate as shown above. Point is punched into auto (left) and officer is then ready to extricate victim (right)—all in a matter of only two minutes.

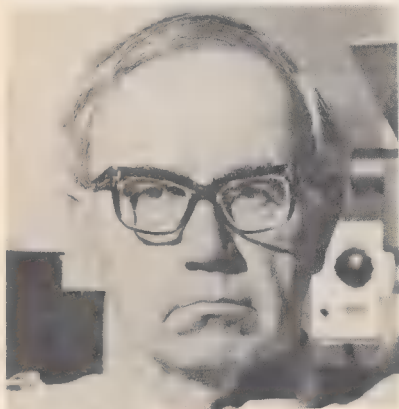
Stiff neck, sore muscles are helped with air-driven stretch appliance below. Developed in West Germany, "extensor" brings spinal bones back to normal position after several sessions.

Pictorial Parade





Cruises to Antarctica will be latest in tourist travel when the *Linblad Explorer*, being built in Finland, is completed. Ice-working vessel will accommodate 100.



BIPS

Self-focusing glasses being worn by their inventor, Dr. Martin Wright of National Institute for Medical Research in London, may do away with bifocal need. At right is dismantled pump used to fill hollow lenses and one thin flexible wall with refractive liquid to change focus.

Shock protection chairs and deck platforms (below) developed by Navy for troops in Vietnam for protection from shock concussion, a constant problem when riding river assault boats.



Managers, technicians, engineers, safety experts — they work for 20,000 subcontractors and are all a part of the Apollo space project. There are more than 350,000 of these people. Their role is vital, and they're proud of it.

It takes 350,000 people

by Andrew Hamilton

SOME TIME THIS YEAR a mighty Saturn rocket will thunder up from Cape Kennedy hauling a 49-ton Apollo spacecraft and three astronauts. For eight days the world will hold its collective breath while these modern-day Columbuses voyage to the moon, land on it and return.

The astronauts will be the public heroes, and rightly so. But there are thousands of behind-the-scene men and women whose talent, energy and creative spirit have contributed immeasurably to the success of the Apollo program.

Each of the 350,000 managers, engineers, technicians and safety experts employed by more than 20,000 companies throughout the United States can say with pride: "I helped to put the first astronauts on the moon!"

One such is six-foot two-inch, 220-pound Bob Haas who played center

for West Point during the late 1940s. Now an engineer with the Marquardt Company in Van Nuys, Calif., he bosses a team that has produced and tested Apollo's reaction engines. These 100-pound energy packages allow changes of direction in mid-course, correction for yaw, pitch and roll, and separation of the command module from the lunar module.

Working 15 hours a day is no novelty for Haas. "As we used to say in football, we give the job 120 percent."

Another is Maurice Knisel, a ham radio operator, who tests antenna positioning equipment in Motorola's anechoic chamber in Scottsdale, Ariz. His grandfather didn't even own an automobile, but Knisel would like to go to the moon himself some day.

"To be the first ham operator on the moon. That would be a thrill."

Three others are general manager Ben Sallard, electrical expert Brinkley Blackwell and financial wizard



U.P.I.

le to put 3 on the moon

Matt Allen of Progress Aerospace Enterprises, in Philadelphia, Pa. — America's first black-owned aerospace company. PAE supplies electronic components to General Electric, which builds communications equipment for Apollo.

The Rev. Leon Sullivan, a Negro leader in Philadelphia who first had the idea of organizing an aerospace company among his people, points out: "When the first astronaut lands on the moon, we want him to have something that we have made."

Women, too, have played important roles.

At the Weber Aircraft Company in Burbank, Calif., Mrs. Evelyn Babis, a grandmother, wields a 600-watt iron ("something like a soldering iron") to heat-seal the edges of DuPont Armalon in making Apollo couches. This non-flammable fabric, incidentally, is also used for conveyor belts in cookie factories.

At Avco's plant in Lowell, Mass., Gloria Rubino stands all day gunning resinous ablative material into the honeycomb surface of the Apollo heat shield. This is 380 square feet of protective covering on the base of the module that must withstand re-entry temperatures up to 10,000° F.

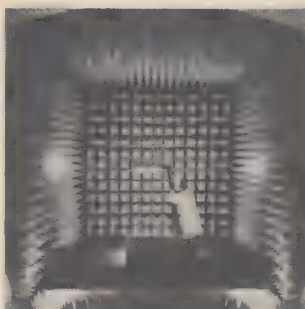
"Sure it's tiring," says gunner Gloria. "But it's my contribution to the most important engineering project of this century."

Also playing an important behind-the-scene role in the Apollo program has been Gean A. Hitchcock, an electronics technician. Her job is to wire and solder a unique heating unit that supplies hot water for food and drink preparation.

Mrs. Hitchcock, mother of an 18-year old son, has worked in electronics for the past 12 years, and on the Apollo program for six. She takes great pride in being a member of the Apollo team and attended a special



Heat shield system, Mass.



Anechoic chamber, Arizona



Rotational hand control, Minnesota

NASA training school to perfect her soldering and wiring skills.

"You might say that my job is to make sure the astronauts get a good, hot cup of coffee while in flight," she says.

All along the way — from raw ore pile to environmental control system — materials and equipment that go into the Apollo projects are analyzed and inspected.

The command module itself has been air tested at White Sands, N. M., and drop tested in the Gulf of Mexico and at the North American Space Division plant in Downey, Calif.

Pressurized moon suits, stitched by seamstresses at the International Latex Company in Dover, Del., are tried out for mobility in the lava beds near Bend, Ore., and in weightless

atmospheres at the NASA Manned Space Flight Center in Houston, Tex.

Parachutes, manufactured in El Paso, Tex., are flight-tested and re-packed and flight tested again at the U.S. Navy Parachute Center in El Centro, Calif.

"Anything that goes into Apollo," says Dale Myers, program manager for the Apollo module at North American Rockwell, "whether it be a soldered electrical connection or a complete system, must be designed right, built right and used right. Astronauts can't bail out on the way to the moon."

To get there and back safely, moon-bound explorers must have not only a mighty rocket and a sophisticated space vehicle, but a score of little, every-day items that are neces-

Medical supplies, Florida



Liquid-cooled undergarments, Del.



Instrument dials, New Jersey





Launch escape rocket motor, Calif.



Environmental control unit, Calif.



Dehydrated meals, Calif.

sary to a successful flight. For example:

- Plastic-packaged meals that are compact, crumble-proof and nutritious. These dehydrated snack lunches, made edible by adding hot or cold water, cost \$200 apiece.

- Shoes that have a pad of tiny hooks on the soles to keep astronauts' feet firmly fixed to the rug-covered deck — preventing them from doing a reverse jack knife dive when they bend over.

- A compact 12-ounce tool kit that can be used for some 30 chores — such as opening and shutting valves, adjusting couches, tightening equipment.

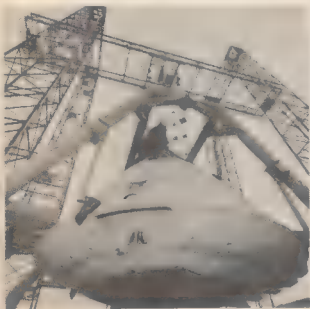
- Another kit of tools that astronauts can use in digging rock samples from the moon. This kit weighs 62

pounds on earth, but only 10.3 pounds on the moon where the pull of gravity is one-sixth as great.

- A 1.3-pound medical kit that contains not only such home remedies as band-aids and sunburn lotion, but pain-reducers, stimulants, antibiotics and decongestants. (Read "Lunar Medicine," page 19, *Science Digest*, February, 1969.)

The largest piece of equipment developed for the Apollo project is a metal monster called "the crawler." This is a 5.5 million pound machine built by engineers and workmen of the Caterpillar Company. Its job is to move the Saturn rocket to the launching pad. Mounted on tank-like treads, it travels at one mile per hour, carries a load of 12 million pounds, and requires a roadbed as wide as the

Command module testing, N.M.



Welding and wiring, Calif.



Portable color TV, New York



New Jersey turnpike.

Smallest items are the tiny welds in the Philco-Ford magnetometer that astronauts will carry in their walk on the moon to measure the magnetic field. About as large as the dot on this "i," thousands of these solidified droplets weigh but a pound.

The bits and pieces that go to make up the massive Apollo project produce paper work on a massive scale. One small sub-contractor complains, "I produce 10 pounds of documentation for every one-pound component I make."

Another wisecracks, "Astronauts don't need a rocket to take them to the moon. Stack up all the paper work and they can climb there."

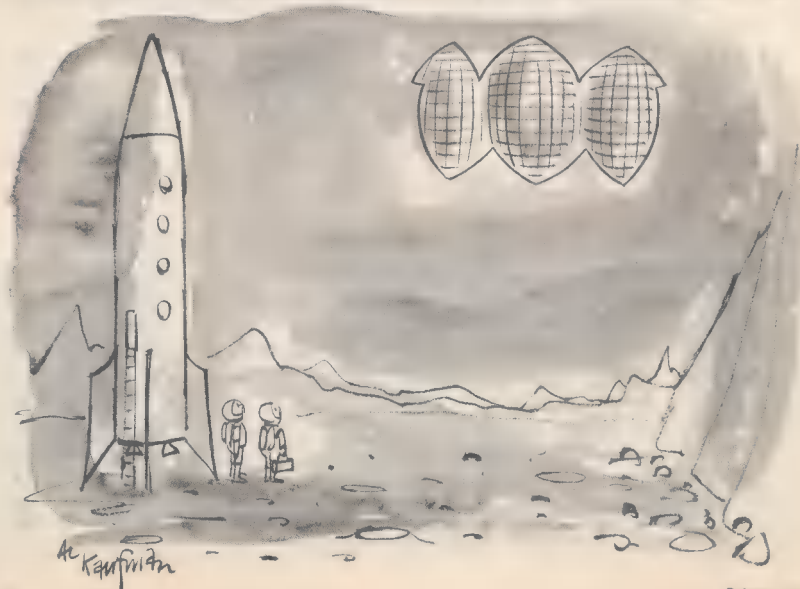
In spite of Herculean efforts to develop engineering know-how and technical skill for Apollo, there have been regrettable failures. The most tragic was the flash fire in the command module on Jan. 27, 1967,

in which Virgil Grissom, Edward H. White, Jr. and Roger B. Chaffee lost their lives.

But out of the bitter despair of that moment, American engineers, technicians and workmen have redesigned and rebuilt not only the Apollo command module but confidence in themselves and their workmanship. As a result, President John F. Kennedy's goal of putting a man on the moon before 1970 is about to be realized. The spirit of the 350,000 who made it possible is exemplified by North American Rockwell leadman Jim Gleaves.

He will be one of the last men on earth to bid goodbye to the astronauts, and his hand will be on the umbilical cord just before it drops away from the Apollo capsule.

"They'll make it," Gleaves said recently. "We've built a damn good spaceship and it will carry those three to the moon and back."





This Hutterite woman lives the simple life on a communal farm and can expect to give birth to at least ten children during her lifetime.

Science Month

The fertile folk

THE MOST FERTILE population group in the world may well be a fanatical Protestant sect called the Hutterites, members of which are concentrated on communal farms in the northwestern United States and in Canada. According to the Population Reference Bureau, the Hutterites have a birth rate of 46 per 1,000 compared to the current U.S. rate of 17.9, an all-time low.

The Hutterites, who frown on birth control, divorce and the single life, are increasing at an annual rate of about four percent, which makes them possibly the fastest-growing population on earth. There were only 440 of them when they came to this country from Russia in the 1870s; now there are over 15,000, most of

them in North Dakota, Montana and Canada. At this rate, there will be almost a million Hutterites in a century and more than 55 million in 2169.

Childbearing continues among Hutterite women virtually until menopause, a pattern that seems unique in the world. At ages 40 to 44, Hutterite women have a higher fertility rate than that of women in the United States, France and Sweden during their maximum fertility years of 24 to 29. The fertility rate for Hutterite women 35 to 39 exceeds that of any women on record.

The median number of children born to Hutterite mothers is 10.4—a figure comparable to that for women in pioneer America.

Experts at the Population Reference Bureau suggest that maximum fertility combined with considerable inbreeding over the past century may have resulted in a "superfecund" strain of human being among the Hutterites. Genetic considerations aside, however, the Hutterite religion provides ample reason for their baby boom. The faith, an offshoot of Anabaptism, takes literally the Biblical injunction, "Be fruitful and multiply."

To a Hutterite woman raised in the tradition, birth control is such a grave offense that she hesitates to practice it even if her life is in danger. The maternal death rate is high among the Hutterites and rises sharply after the third pregnancy, much as it did a century ago in the United States.

Even if a couple wanted to practice birth control in secret, the communal life of the Hutterites would make it difficult. Each married cou-

ple occupies an apartment in a communal dwelling that usually houses 14 or 15 other couples. It is an article of belief that the individual apartments should be open to all to discourage privacy and individuality—both regarded as sinful.

When it comes to sickness, ailing Hutterites readily visit doctors and enter hospitals. The community pays all medical bills. As a result, their death rate is only 4.4 per 1,000—less than half that of the U.S. (9.5) and lower than that of any other country.

Hutterite communes will probably maintain their unusual rate of fertility as long as they maintain their economic stability. Currently, their communal farms, using the latest methods of scientific agriculture, are showing a profit. If the communes ever do deteriorate, says one expert, it will probably be due to the demands of individual families for recognition of private property.

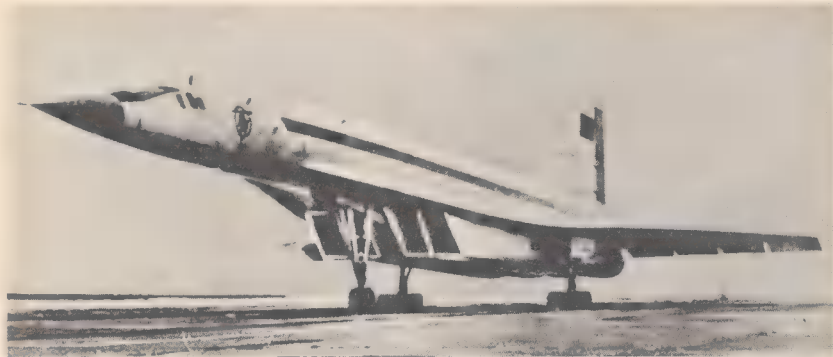
Trumpeter is back

The official list of rare and endangered species in the United States has just lost an entry—the trumpeter swan. According to Dr. John S. Gottschalk of the Department of Interior's Bureau of Sport Fisheries and Wildlife, "This swan is no longer in danger of extinction, nor can it be considered rare."

Biologists from the Bureau counted 3,641 trumpeters in an aerial survey last fall, and they estimate there are between 4,000 and 5,000 birds in the United States. Canada has about 1,000 more. Most of the birds spotted were in Alaska (2,842), with Montana and Wyoming having fairly

sizeable populations, too. There are lesser numbers of birds in Idaho, South Dakota, Oregon, Washington, Nevada and Minnesota. In addition, some 50 U.S. zoos have captive species.

It was a different story back in 1932, when the population of the trumpeter had dropped to just 69, all of them in the Yellowstone-Red Rock Lakes-Jackson Hole region of Montana, Idaho and Wyoming. At one time the big white birds had ranged over much of the central part of the continent from Alaska to the southern United States. They wintered in the Ohio and Mississippi Valleys, the lower Columbia River Valley and along the Gulf of Mexico.



U.P.I.

Soviet Union is now test-flying its supersonic airliner, the TU144, beating the U.S., Britain and France in flying the controversial SST. Tests were rumored for months. (See "Engineering shambles: The SST," Science Digest, January '69.) All systems were tested, according to Tass News.

The arrival of the western settler put the trumpeter in trouble. Prized both for their meat and their skins (the down made fine featherbeds and quilts and the feathers were used to decorate women's hats), the swans became a prime target for hunters. The draining of the marshlands also took its toll. As the population shrank, the remaining trumpeters retreated to remote areas in the Northwest.

Then the picture changed. The Federal Migratory Bird Conservation Act of 1929 made it possible for the Red Rock National Wildlife Refuge to be set up in 1935 to protect the remnants of the flocks. The birds flourished in the refuge, which has just the assortment of marshland, lakes, streams and plant life trumpeters prefer. Beginning a few years later, some of the birds were transplanted to other refuges as a safety measure. A few were distributed to zoos, with the Federal Government retaining title to them and any offspring.

The transplants have obviously

been successful. All of the birds spotted in South Dakota, Oregon, Washington, Michigan and Nevada — a total of about 214 — are either transplants or offspring of transplants. Except in Michigan, these transplanted birds were all either on or near national wildlife refuges.

Cruising at 100

You'll be a slow poke if you cruise the highway of the future at anything less than 90 mph, predicts Cornell Aeronautical Laboratory, an independent research organization.

The car won't look radically different than today's, but it will be redesigned for efficient cruising at high speeds. Changes will include reduced weight, streamlining, less horsepower and, possibly, "spoilers" like those on airplane wings for balance.

Full streamlining could cut a car's drag coefficient so much that it will more than offset a reduction in horse-

power. You'll accelerate to 100 mph in up to 18 seconds, your top speed about 140. You'll get 24 to 25 miles per gallon at 50 mph, 11 to 13 miles per gallon at 100 mph.

The highways on which you'll travel will be redesigned, too, says Cornell. They have plans for one with a merge-control system to direct cars into the flow and a computerized surveillance and control system to watch mainstream traffic. Both systems would actuate visual signals to particular drivers.

Lanes would be 13 to 15 feet wide,

Cooling undergarment for space suits cools by principle of water boil-off under vacuum. Special pads held against body are connected to vacuum system. By McDonnell Douglas Astronautics, Santa Monica, for NASA, Air Force.



a little wider than interstate standards today, and each lane would have an emergency escape shoulder edged by guard rails. The rails would deflect the car along the shoulder rather than bouncing it back into traffic.

We're leaders in math

The U.S. is now the world leader in mathematics, according to the National Academy of Sciences. Not only is this country recognized as the leading producer of mathematics and mathematical talent, but it also holds certain distinctions. Half of the Fields Medals (often called the Nobel Prizes in mathematics) awarded since 1945 have gone to Americans. More than a third of all invited addresses at the last four international mathematical congresses were given by Americans. And in one recent year, between 25 and 42 percent of all references in three leading European mathematics journals were to research published in American journals.

Visiting termite

The U.S. is faced with a new threat — a Formosan termite known to entomologists as *Coptotermes formosanus Shiraki*. A pale brown creature about an eighth of an inch long, it's bigger than common domestic species and, some think, hungrier.

It is hungry enough, at any rate, to have eaten its way through a number of wooden structures, utility poles and trees in the southern United States and Hawaii since it was discovered here in 1965. It can live in colder climates so it may well

be on its way to other parts of the U.S. Ships from Asia probably carried it to this country, possibly as long ago as the end of World War II.

"I don't think it's any more voracious than any other termite but it does have more young so the colonies may eat more," says John C. Pallister of the department of entomology at the American Museum of Natural History. "This species feeds on a variety of things, too. It will come right through the floor, chew its way up the leg of a chair and then when you sit on the chair, it collapses."

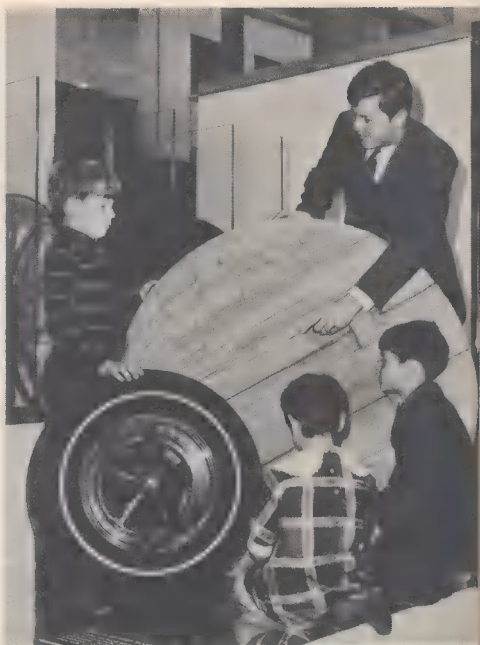
There are several thousand species of termites in the world, a number of which are found on Formosa (Taiwan), he added.

Tattooed lobsters

Up in Vancouver, British Columbia, a man named Doc Forbes is tattooing drunken lobsters at government expense. The creatures are dipped in a pail of water liberally laced with alcohol to tranquilize them before Forbes, a local tattoo artist, applies his needle. The reason? Well, since 1896 the Canadian Fisheries Department has been stubbornly trying to transplant Atlantic lobsters to the Pacific. The trouble is, the transplanted lobsters simply vanish. If they're tattooed, figures the Canadian organization, they can be identified if they turn up anywhere.

The core of Mars

Mars has an iron core like the earth's, but it is not as large nor is it molten, reports Dr. Alan B. Binder



History of the wheel, from earliest crude solid wooden wheel to today's most modern Fiber-glas-belted tires was shown in an exhibit that recently opened the new Owens-Corning Fiber-glas Center at 717 Fifth Ave., New York, N. Y.

of the IIT Research Institute. The core is probably between 980 and 1,180 miles long, accounts for less than five percent of Mars' total mass and has a temperature between 1,930° F. and 3,180° F. With data obtained from Mariner IV, Dr. Binder used a technique called mathematical modeling to reach his conclusions. Values for the known conditions on Mars were placed in equations along with trial values for unknown conditions. The equations whose solutions agreed with what is known about Mars were assumed to contain the trial values most likely to be correct.



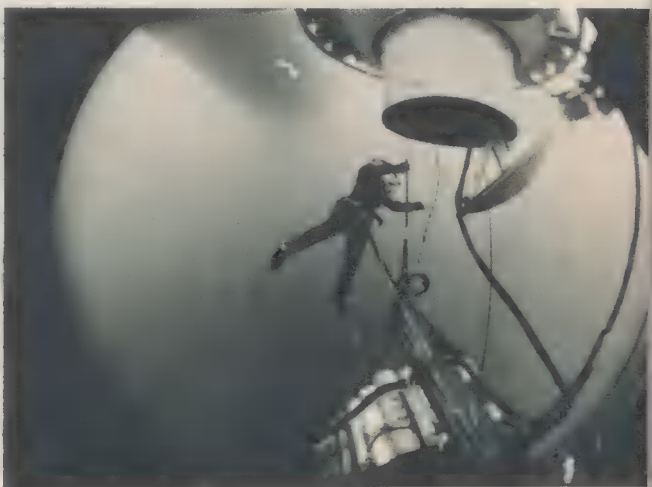
Deep-diving Frenchmen

STRAPPED IN A HARNESS and encased in a steel drum called a "Livingcase," Frenchman René Veyrine makes dives into the depths of the Mediterranean off the coast of Marseille. Most of the dives are as deep as 750 feet, and Veyrine hopes that someday he will be able to

make it below the 2,000-foot level.

Before any dive can be made, 60 technicians have to make ready tons of ocean gear that include lifelines, cables, cameras, electrical equipment, life sign monitors and communications systems.

Electrodes are planted on the



All photos Pictorial Parade

diver's head (left) prior to the descent in the Livingcase. Veyrine's brain waves are monitored by an electroencephalogram during the entire dive.

Once inside the Livingcase, the diver is lowered over the side of the ship (middle) to a depth of at least

750 feet. Once at this depth, the diver swims out of the case, still in his harness (right).

The French government is conducting these deep-diving tests as a part of its ocean exploration program which is seeking ways of utilizing the vast natural resources of the oceans.



Relics that belonged to some of America's earliest inhabitants are being found today in the . . .

Text and photographs
by Nelson Wadsworth

Screens are used to comb through the dust of the cave for any remnant of prehistoric Indian culture. Face masks are must to protect men's lungs from the choking dust.



Dusty Secrets of Hogup Cave

A HOT, DRY WIND sears the Great Salt Lake Desert wastes, churning clouds of fine dust from the entrance of a hillside cave. Inside, men work in the afternoon heat, some digging, others pushing wheelbarrows loaded with cave debris or sifting the earth with screens built on the lip of the embankment. Each man wears a mask to filter the choking dust.

"Without masks the men would

soon be too sick to work," says Dr. C. Melvin Aiken, field boss of the dirt-caked crew. "Out here the glamour of archaeology soon disappears—until something fascinating turns up on the screens or inside the cave."

Dr. Aiken and his crew are anthropologists from the University of Utah. They are excavating a trench through the floor of Hogup Cave, an early archaeological site recently dis-



covered in the drab Hogup Mountains, just west of the Great Salt Lake, about 75 miles northwest of Salt Lake City.

These seven young men and ■ Ph.D. are searching for knowledge about prehistoric man and his primitive beginnings in the Great Basin of Western America. After two sum-

mers of grimy work, Hogup is yielding new facts about the Western Hemisphere's early Indians whose antecedents go back 10,000 years. In the dusty search at least one long-established theory about prehistoric America is being openly challenged.

Dr. Jesse D. Jennings, professor of anthropology at Utah who is direct-

Dr. Jesse D. Jennings holds the moccasin of a prehistoric Indian. Numerous articles of clothing as well as tools and weapons have been found. Small etched stones such as the one at the lower left are typical of the Fremont Culture of ancient Indians which existed between A.D. 420 and 1450. Drs. Jesse D. Jennings and C. Melvin Aiken are responsible for the discovery of the ancient relics in Hogup Cave. The two anthropologists discuss the thickness of a stratum at left. Dr. Aiken is standing on the right.



ing the digging with funds from ■ National Science Foundation grant, says artifacts unearthed in the 14-foot-deep trench in Hogup Cave are running contrary to the long-held "climatic theory" of post-glacial America. This theory holds that vegetation and human life disappeared from arid sections of the West during

■ drought that lasted from 5000 B.C. to 2500 B.C. The drought, or Alti-thermal as it is called by scientists, was at one time a blank page in the history of man in North America. It was during this warm, dry period that many of the huge Pleistocene lakes like Bonneville in Utah and Lahontan in Nevada were thought to

have dried up completely. The theory was that man could not exist in such dry conditions.

"Our findings appear to refute the drought theory," Dr. Jennings says. "The range of climatic fluctuation in the vicinity of Hogup Cave was not enough to limit human habitation.

Samples taken from 16 different levels of the cave trench have been carbon-dated to show continuous human habitation from about 6400 B.C. to A.D. 1600. Carbon 14 samples superimpose the drought period, indicating that man indeed survived in the harsh land.

Dr. Jennings believes the drying out period — after the last glaciers receded more than 10,000 years ago — has been gradual and is continuing in modern times. On the other hand, those supporting the Altitheoretical theory base much of their conclusion on observation of widespread erosion after the Wisconsin Stage glaciers were gone. This erosion, they surmise, was caused by the disappearance of vegetation in a hot, dry climate. But Dr. Jennings points out that erosion in the arid West goes on with vegetation under today's climatic conditions. He believes evidence of widespread erosion could point to *wetter* rather than drier conditions during the Altitheoretical.

Remains of flora and fauna dug from the cave seem to support Dr. Jennings' hypothesis that the terrain was more livable during the ancient Indians' occupation. Bones of several small mammals, for example, including the rock chuck, rock squirrel, northern pocket gopher and pygmy rabbit, were found in the cave's Altitheoretical strata, but not in the layers after 2500 B.C., when the drought supposedly ended.

"These are creatures of the wood-

land," adds Dr. Jennings. "They preferred cooler, wetter climates; yet we find them as part of the Indian diet in an area where they cannot survive today."

Thousands of artifacts screened from the debris describe the three major Indian cultures of Central and Northern Utah that used the cave. These include the primitive Desert Archaic people prior to A.D. 400, the Fremont Culture from 420 to 1450 and the modern Shoshoni. Bands of Shoshoni were reported in the vicinity of Hogup Cave as late as 1850.

"What makes this cave unique," says field-boss Aiken, "is that it contains a fairly complete record of Great Basin man almost up to the arrival of the white settlers."

Dr. Jennings believes the people who occupied Hogup Cave were fine craftsmen, and their handiwork is reflected in the artifacts found at various cave levels. Among them are flint knives, arrowheads, hide moccasins, bone implements, woven mats, throwing sticks, cordage, fragments of baskets and pottery and stones finely etched with designs. The artifacts are remarkably well preserved because of the dryness of the cave.

"What we are doing," says Dr. Aiken, "is digging through the Indian trash heaps. The artifacts we are finding are things they didn't want any more and threw away."

Although no skeletal remains of the early cave dwellers have been found, Dr. Jennings envisions them as slight and graceful and not heavily muscled. He believes they buried their dead in crevices, making the skeletons almost impossible to find today. The Paiute and the Goshute Indians of Utah could be the surviving culture today.

Seeing eye dog for a dog

IT TAKES A LOT of work and patience to train ■ seeing eye dog—at least that's what the experts say. But a three-year-old German shepherd by the name of Simba seems to have learned it all on her own. She acts as self-appointed guide dog for a blind seven-year-old spaniel.

Simba leads the spaniel, Minky, by gently tugging on her ear. The German shepherd appears to be devoted to the spaniel who has only recently gone blind. The dogs' owner, Esmé Bidlake of Kent, England, swears that he had nothing to do with Simba's odd role as protector and leader for the spaniel. He thinks the dog does it purely by instinct, sensing the helplessness of her friend.

Whatever the reason, it is an odd sight when Simba appears at the top of the stairs with Minky's ear in her mouth. She leads the smaller dog to the bottom of the stairs, lets go of the ear temporarily while she opens the door with her paws and then takes the spaniel out for a walk.

Behaving like a trained guide dog, Simba holds onto Minky's ear when

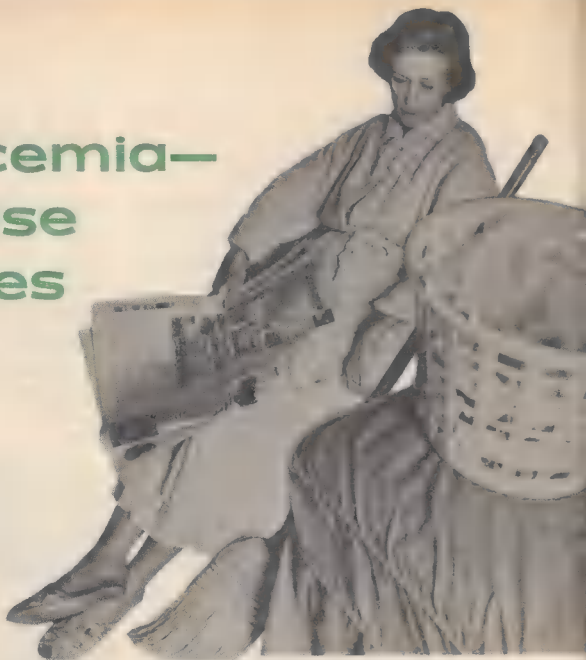
they approach a road, waits for any traffic to pass and then gently guides Minky across the road, still holding on to her ear.

"Simba will even guide her to her feeding bowl," says the dogs' owner, "and sit beside Minky while she has her meal."

BIPS Photos



Hypoglycemia—the disease that makes women tired



by Barbara O'Connell

PAULA, a pretty blonde divorcee in her early 30s, was always tired. When her co-workers in a Manhattan advertising agency went out for morning coffee, she curled up on a couch in the ladies room to rest. She lay down again at lunch and before she went home. At home she took a nap before dinner and went to bed at 10. Men called for dates but Paula seldom answered the phone—she was too tired. She moved from her apartment to a women's hotel for the same reason.

Paula had other complaints, too. Her ears rang, she slept poorly, her heart palpitated, and she was often dizzy, depressed and nauseated. Over a 10-year period, her symptoms took her to more than a dozen different doctors. After listening to her tale and checking her physically, the doctors tactfully brought up the subject

of psychosomatic illness. Had she considered changing her job? Moving to another state? Getting a hobby? Getting a boyfriend? Seeing a psychiatrist? All the doctors prescribed tranquilizers.

One day, Paula came across an article in a women's magazine describing a tired housewife who had low blood sugar, a condition called "hypoglycemia." Paula had never heard of hypoglycemia but the symptoms of the housewife reminded her of her own. Armed with the magazine, she visited still another doctor. He made an appointment for her to take a "glucose tolerance test"—a test she'd never had. Paula fasted 12 hours before the test. When she arrived at the laboratory, she drank a glass of glucose, the fluid into which the sugar we eat is converted. A technician took samples of her blood over a five-hour period.

The results of the test showed that



Roche Laboratories

Many women complain of being tired, suffering dizzy spells, being depressed. Most people write it off as housewife doldrums or hypochondria. But some of these women are victims of hypoglycemia, a little-known disease caused by low blood sugar—the opposite of diabetes.

Paula's blood sugar ranged from 54 milligrams per cubic centimeters of blood down to 48. The normal range is between 100 and 80. Paula had hypoglycemia.

After more tests to determine that Paula's hypoglycemia was functional and not caused by an organic condition (such as a tumor), her doctor put her on a strict diet to raise her blood sugar. No sugar, no alcohol, few carbohydrates, an abundance of protein. She had to eat smaller, more frequent meals. Within six months after she began the diet, Paula felt well enough to rent an apartment and accept dates. She was seldom tired and her other symptoms had disappeared.

Hypoglycemia (literally, too little glucose in the blood) is estimated to affect perhaps one-twentieth as many people as diabetes in the United States. Sometimes called "the opposite of diabetes," low blood sugar is

produced in most cases by too much insulin. Diabetes, on the other hand, results from a lack of insulin. There are other important links between low and high blood sugar. Recent evidence indicates that at least some cases of hypoglycemia are actually the early stages of diabetes, and hypoglycemia was first recognized in diabetics who had been given an accidental overdose of insulin. Such overdoses can have fatal consequences, a fact that's been put to use by a few of our more sophisticated murderers. A hospital attendant in Los Angeles was recently convicted of killing three relatives by injecting them with insulin.

By far the greatest number of hypoglycemias are functional in nature, however, rather than the result of an overdose of insulin or a diseased organ. Symptoms are chronic but not progressive and with correct treatment, all can be reversed.

But this cheering prognosis is not much use to the functional hypoglycemic who *hasn't* been diagnosed. More often than not, physicians admit, this is what happens. Many medical men simply don't recognize the vague symptoms of functional hypoglycemia in patients who say they are nervous, anxious, tired and confused. It sounds too much like hypochondria to the overworked general practitioner. He can hardly be blamed for giving such patients a quick checkup, writing a prescription for tranquilizers and telling them to call in two weeks. Next patient!

"I don't think a busy general practitioner would recognize hypoglycemia," says a New York internist who has turned up a number of cases of low blood sugar in patients referred to him for other complaints. "I don't think a surgeon would either. But most internists would."

Difficult to diagnose

Even the more serious kinds of hypoglycemia, which are manifested by such symptoms as blackouts, comas and psychoses, are usually not diagnosed correctly until months or years have passed, according to Dr. Robert H. Williams of the University Hospital, Seattle. In these organically-caused conditions, the severe and prolonged low blood sugar level can lead to permanent brain damage and death.

To understand how low blood sugar can produce such diverse effects as brain damage and fatigue, let's look at the endocrine glands, the system of bodily checks and balances which maintains blood sugar at the right level. The carbohydrates we ingest in our food are converted into glucose, some of which is used im-

mediately as fuel by body cells and some of which is stored in the liver for later use. Insulin, a substance secreted by an endocrine gland called the pancreas, helps cells absorb glucose. Hormones secreted by other endocrine glands—including the adrenals and the pituitary—counter the effects of insulin.

When one of these organs becomes affected by disease or begins functioning poorly, the result is a lack of balance between glucose, insulin and the insulin antagonists. If too much insulin or too little of the insulin antagonists are produced, the result is low blood sugar. If too much glucose or too little insulin is secreted, the result is diabetes.

To counter the effects of their condition, diabetics stay away from sugar and take insulin to help the cells absorb their quota of glucose from the blood. To counter the effects of low blood sugar, hypoglycemics stay away from sugar and balance other carbohydrates with protein. But why not eat sugar if sugar is needed? Sugar and sugary foods like pastries are so quickly converted into glucose that they trigger an oversupply of insulin in the hypoglycemic. The superabundant insulin helps the cells absorb glucose at top speed. Soon there's little sugar left in the blood.

Protein, however, is converted to glucose much more slowly, allowing the pancreas to produce only an adequate supply of insulin. With the correct amount of insulin in the blood, the cells absorb glucose at a normal rate.

In functional hypoglycemia, the drop in blood sugar comes two to five hours after the patient has eaten sugar or an inordinate amount of other carbohydrates. The drop precipitates symptoms. The patient trem-

If there's no organic cause for a person's hypoglycemia, she must diet for the rest of her life.

bles, perspires and feels nervous. His brain, which depends almost entirely on glucose for its energy, produces such manifestations as confusion, vagueness, visual disturbances and dizziness. In more severe kinds of hypoglycemia, the undernourished brain may induce comas and convulsions.

Functional symptoms are more noticeable after breakfast and after lunch than after dinner, according to Dr. Vincent Marks and Dr. E. Clifford Rose, the British authors of *Hypoglycemia*. The manifestations subside within 30 minutes. In between attacks, the patient usually complains of milder symptoms: fatigue, weakness, inability to concentrate. Drs. Marks and Clifford comment on some of the other peculiarities of functional hypoglycemia: it affects many more women than men and the commonest age of diagnosis is between 30 and 40—it is rare under 20 or after 50. In the United States, the condition seems to occur most often in the South and Middle West. Cases are rarely seen in Canada and Europe, although during World War II a number of cases were reported from Britain, where dietary conditions were poor.

What should you do if you think you may have low blood sugar? A five hour glucose tolerance test like the one taken by Paula will detect most hypoglycemics. Physicians differ on their interpretation of the results of the test but almost all agree that a blood sugar level below 50 milligrams per 100 cubic centimeters of blood can accurately be called "hypoglycemia."

If the glucose tolerance test doesn't produce a low reading and you have all the symptoms of hypoglycemia, your doctor may recommend another test: the electroencephalogram (EEG), which measures electrical brain waves. The waves generated by hypoglycemic differ markedly from those of a normal person. In some cases, these hypoglycemic waves correlate with average or even high blood sugar. Actually, as Dr. Williams points out, glucose utilization, not glucose itself, is the important factor. An electrical change in the brain, he finds, correlates better with cerebral utilization of glucose than with actual blood sugar levels.

But a physician's work is "only starting" when he diagnoses hypoglycemia, says Dr. Maximilian Fabrykant of New York University Medical School. Dr. Fabrykant checks each possible organic cause of the condition, settling on functional hypoglycemia only if indications of all other kinds of hypoglycemia prove negative. He thinks that a somewhat higher percentage of hypoglycemic conditions may be due to organic causes than is usually accepted. In one study he carried out, he found that 62 percent of hypoglycemia diagnoses included an unsuspected condition to account for the symptoms.

If your physician finds an underlying disease, he'll treat the disease itself. If not, he'll prescribe a diet, with or without drugs to help raise the blood sugar level.

Hypoglycemics, like diabetics, have to stay on their diet for the rest of their lives. After their blood sugar rises, though, they can have an occa-

sional cocktail or pastry. By that time, however, some have lost their "sweet tooth." "Sugar looks repulsive to me now," says one hypoglycemic. "When I'm in a restaurant and someone says, 'Please pass the sugar,' I pass it as if it were arsenic."

Drugs are sometimes recommended along with diet for functional hypoglycemics. A Yonkers, N. Y., endocrinologist, Dr. John W. Tintera, administers an expensive drug called adrenal cortical extract to patients whom he diagnoses as hypoglycemics. ACE, as it's called, is injected into the patient frequently at first, then at longer and longer intervals. The injections are usually discontinued after a year or two. Dr. Tintera uses ACE, he explains, because he puts the blame for functional hypoglycemia on the adrenal glands. He prefers to refer to a condition he calls "hypoadrenocorticism"—defective functioning of the cortex of the adrenal gland—rather than hypoglycemia. The use of ACE with diet produces better and quicker results than diet alone or diet plus other drugs, such as cortisone, he claims.

A few years ago, Dr. Tintera became the leading medical figure in an organization called the Hypoglycemia Foundation, which distributes literature on his method of treatment to physicians. At present, the Foundation claims to have some 1,500 physicians across the country who are administering ACE to hypoglycemics. A lay arm of the organization, Health Frontiers, has chapters in Washington, D. C., Manhattan, Long Island and Pennsylvania. Other chapters are expected to open soon in Florida, California, Texas, and Connecticut.

The publicity engendered by the

Hypoglycemia Foundation and Health Frontiers is undoubtedly of service to the undiagnosed hypoglycemic, miserable with his physical, mental and emotional symptoms. Unfortunately, the use of ACE to treat hypoglycemia is of no value at all in the opinion of endocrinologists surveyed at New York University Medical School, Cornell University Medical School, and New York Medical College.

"The use of aqueous adrenal cortical extract in hypoglycemia therapy is prehistoric," says Dr. Rachmiel Levine of Manhattan's Flower and Fifth Avenue Hospitals, which are connected with the New York Medical College. He explains that the use of ACE preceded that of cortisone, which is synthesized from ACE. Some endocrinologists use cortisone to raise the blood sugar level. The amount of cortisone in ACE, according to Dr. Levine, wouldn't raise the low blood sugar of a mosquito. The 1968-69 edition of *Drugs of Choice*, a standard text for physicians, supports Dr. Levine's stand.

Would ACE hurt a patient? "Only in his pocketbook," responds Dr. Levine. "There's nothing in there to hurt anyone."

One reason for the gulf between the thinking of Dr. Tintera and his colleagues lies in the obscure origin of functional hypoglycemia. Dr. Tintera thinks the cause is in the adrenal glands but other endocrinologists think that adrenocortical dysfunction represents only a small part of the hypoglycemic syndrome. Research is being done in the field and someday scientists hope to be able to pinpoint the culprit. Until then, the most effective treatment for functional hypoglycemia will probably continue to be directed toward the symptoms.



Disneyland Productions

The great dinosaur disaster

New evidence indicates that the dinosaurs, such as this triceratops, as well as ancient giant mammals, may have been wiped out by radiation from the explosion of a supernova.

by Daniel Cohen

SEVENTY MILLION years ago something strange and terrible happened here on earth. It was the end of the Cretaceous period, final period of the Mesozoic era, "the era of middle life." For 100 million years giant reptiles had ruled the world. Great dinosaurs dominated the land; the pterosaurs and other flying reptiles were kings of the sky. In the sea it was the ichthyosaurs and mosasaurs who reigned supreme.

Then, with alarming suddenness, they all disappeared. They all went without a single survivor or descendant. The order of reptiles survived, although in the modern world reptiles occupy a humble, almost insignificant position. None of today's snakes, lizards, turtles or crocodiles can count the dinosaurs or great flying or marine reptiles as direct ancestors.

Paleontologist Dr. Edwin H. Colbert says of the dinosaurs, "Not one of them survived into a later geologic age, as is amply proved by the fact that during almost a century and a half of paleontological exploration, the wide world over, no trace of a dinosaur bone or tooth has ever been found in any post-Cretaceous rocks, not even in the earliest of them. The proof of the geologic record on this score is irrefutable." Alas, there is no substance to the wonderful and romantic tales of dinosaurs that still thrive in the depths of some unexplored jungle.

The extinction of the great reptiles after they had been successful for so many millions of years is a real puzzle. It is one of those scientific mysteries that has attracted a lot of attention. Everyone from respected scientists to raving crackpots has come up with a theory to explain the



The American Museum of Natural History

Ancient animals such as the giant ground sloths, toxodonts, glyptodonts and macrauchenias (above) and the saber-toothed tiger, mastodons and others (right) all suddenly and mysteriously disappeared. The most widely held theory is that these animals could not adapt to their environment and were eliminated by evolution.



death of the great ruling dinosaurs.

Often overlooked, however, is that the mass extinction of the great reptiles is not an isolated phenomenon. Throughout the long history of life on earth there have been waves of mass extinction. One that was less complete but much closer to our own time took place at the end of the Pleistocene or Ice Age, a mere 10,000 years ago. The world has not yet recovered from whatever happened.

Ten thousand years ago the ancestors of the American Indians hunted the imperial mammoth, largest known member of the elephant family, across western North America. In what are now the Middle Atlantic and New England states another huge relative of the elephant, the mastodon, was a thriving inhabitant of the forests. Up north, on the fringes of the ice sheet the woolly mammoth made effective use of its great hard teeth to grind up the tough tundra vegetation.

North America was not merely an elephant's paradise. A close neighbor of the woolly mammoth was the woolly rhinoceros. Giant ground sloths, giant armadillos, beavers as big as bears, bison with horns that measured six feet from tip to tip, great saber-toothed cats, giant jaguars, plus a mass of horses, camels and exotic deer and antelopes made their home on the continent.

We like to think of North America, before the coming of civilization, as a natural paradise. It was more like an animal disaster area. Remember the song which describes the West as the place, "where the buffalo roam and the deer and the antelope play"? When from 1804 to 1806 the Lewis and Clark expedition traveled across the continent, the men were astounded by the buffalo (more properly bison). Zoologists are astounded too, but for other reasons. There is something unnatural about the picture. Why an estimated 50 million bison, one species of antelope and a few species of deer? What happened to all those other large animals? The land was fertile and capable of supporting many different kinds of animals, yet they had all disappeared. Some 70 percent of all native North American mammals with an adult body weight of 100 pounds or more died out during a 1,000-year period at the end of the Pleistocene.

Nor was this wave of Pleistocene extinctions limited to North America. It struck with varying degrees of severity throughout the entire world. Think about modern South America; for all its tropical jungles, the continent contains very few large animals. But 10,000 years ago there were a lot of them. Glyptodonts, toxodonts, macrauchenia and a host of strange creatures that most people



have never heard of once populated South America.

Europe and Asia were also hit, although the extinctions were not as massive as those in the New World. Camels and horses which had actually evolved in North America and then died out there lived on in Asia. But mammoths and mastodons, several species of rhinoceros, the giant stag with 80 pound antlers and many other large animals failed to survive.

At first glance Africa with its wealth of large animals looks as though it escaped the wave of extinctions. The impression is incorrect. Although whatever it was that struck the great mammals dealt only a glancing blow to Africa, it still knocked out 40 percent of the large mammals. Notes Dr. Paul S. Martin, professor of geochronology at the University of Arizona and an expert on the Pleistocene, "An imaginary Pleistocene game park would have been stocked with such species as the antlered giraffe, a number of giant pigs, the stylohipparion horse, a great long-horned buffalo, a giant sheep and an ostrich of larger size than is known at present."

In 1866, Alfred R. Wallace, the man who along with Charles Darwin first systematized the theory of evolution wrote:

"We live in a zoologically impoverished world, from which all the

hugest, the fiercest, and strangest forms have recently disappeared. . . . yet it is surely a marvelous fact, and one that has hardly been sufficiently dwelt upon, this sudden dying out of so many large *Mammalia*, not in one place only but over half the surface of the globe." If Wallace had known what we know today he probably would have changed his statement to read, "Over the entire land surface of the globe."

Besides the Cretaceous and Pleistocene extinctions, there are indications that some 230 million years ago, at the end of the Permian period, the earth underwent yet another wave of mass extinctions, after which the character of life on land and sea changed dramatically.

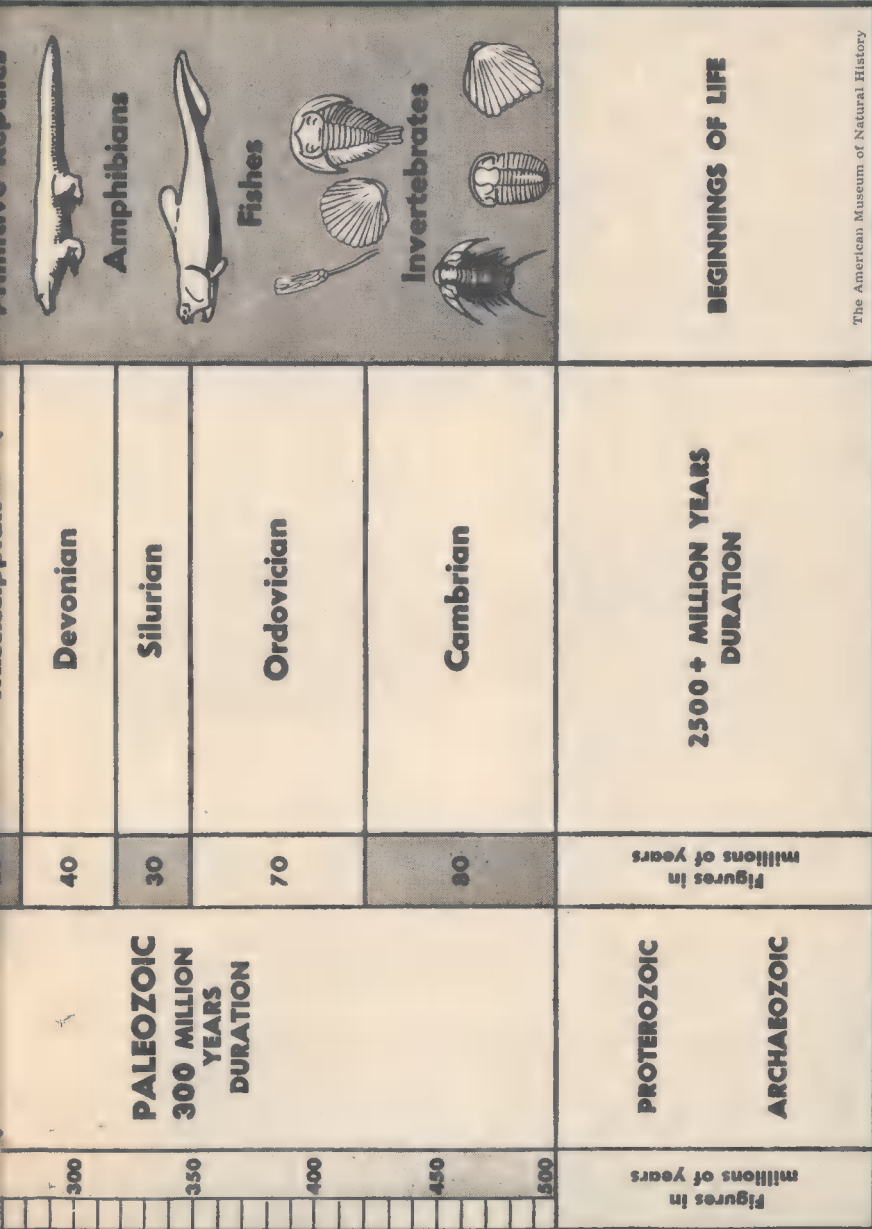
Not only large animals have been affected. At the same time the dinosaurs disappeared, certain types of simple sea creatures also seem to have plunged into oblivion. In fact, the sea contains a disturbing record of regular periods of mass extinction. Samples recently brought up by the specially built deep-sea drilling ship *Glomar Challenger* contain microscopic fossils in the piled up layers of sediment that show indications of periods of abundance followed by periods of stagnation and mass death.

Waves of extinction are a sticky problem for modern scientists. Most frankly admit that mass extinction simply cannot be explained.

Eighteenth and early 19th century scientists would not have been embarrassed by the prospect of mass extinction. They believed the world was swept by periodic catastrophes in which most or all life on earth was wiped out. After the catastrophe new forms of life were created.

But the founders of modern geology, men like the Scotsmen James

TIME SCALE		ERAS	DURATION OF PERIODS	PERIODS			DOMINANT ANIMAL LIFE
		CENOZOIC 70 MILLION YEARS DURATION		Quaternary	Recent Pleistocene	Man	
			70	Tertiary	Pliocene Miocene Oligocene Eocene Paleocene	Mammals	
			60	Cretaceous		Dinosaurs	
			35	Jurassic			
			35	Triassic			
			30	Permian			
			25	Pennsylvanian			



Hutton and Charles Lyell, showed that the earth had not undergone catastrophic geological changes, but that its features had been formed by slow evolution. This is the theory of uniformitarianism, and it is still the accepted view in geology today. Modern geologists, however, are not quite as dogmatic about it as were the founders. Now geologists allow the possibility of limited catastrophes and periods of stepped up geological activity which resulted in fairly rapid changes in the features of the earth.

Quite recently some scientists like Dr. James R. Heirtzler, head of the Hudson Laboratories of Columbia University have suggested that some catastrophic events, major earthquakes, periods of mountain building and radical worldwide climate changes, may all be related in a complex way to wobbles in earth's spin.

Can any of these events also be related to the waves of extinction? On the surface it seems so. The dinosaurs disappeared at a time when the earth was undergoing what geologists call the Laramide Revolution, an intense period of mountain building. This was the time in which the Rocky Mountains, the Himalayas and the Andes arose. Scientists assume, although they do not know for sure,

that the mountain building was also accompanied by changes in the world's climate. We do know that the vegetation of earth changed.

Most people assume that one of these changes, or some combination of changes brought about the extinction of the ruling reptiles. The world got too cold, or too hot for the dinosaurs; they could not eat the newer types of vegetation; the swamps and shallow seas dried up, thus destroying the dinosaurian habitat, etc.

The problem is that most of the great reptiles had already survived most of the changes brought about by the Laramide Revolution. Why didn't at least some of them live through the whole thing? The world did not become too cold or too hot for turtles, lizards or crocodiles. And if it were the changes in vegetation that doomed the dinosaurs, what then caused the simultaneous extinction of the great marine reptiles, and why were flying reptiles replaced by birds?

The extinction of the great mammals at the end of the Pleistocene confronts us with similar problems. The Pleistocene or Ice Age was a three-million-year period of glacial advance and retreat. The reasons for the Ice Age are unknown and represent another of those endlessly fasci-

Extinction of the great reptiles is one of the great scientific mysteries. They had been successful organisms for millions of years when they disappeared abruptly. There are numerous theories that try to explain the reptiles' death. Mass extinction is not exclusive with the reptiles. The great mammals suffered the same fate at the end of the Pleistocene.



nating scientific mysteries. But there is no doubt that during this period large portions of the world suffered severe and rapid alterations in climate. But the great mammals did not simply freeze to death. In fact, most of them died at a time when climate conditions were actually improving in most places. Mass death also occurred in tropical South America and Australia, lands unaffected by the glaciers.

Some scientists have attempted to relate the disappearance of the large mammals of the Pleistocene to the appearance of man the hunter. The theory is that when man mastered the use of fire he developed the fire-drive as a hunting technique. Entire herds of large animals were stampeded over cliffs or into blind canyons and slaughtered en masse. Since early man did not have the weapons to selectively kill a single animal, he may have had to wipe out a whole herd to get any animals at all.

Remains of mass kills of mammoths have been found in the western United States. But even supporters of this "overkill" theory admit that it is neither new, nor widely held. Evidence to support it is not abundant; objections to it *are*. Interest in the "overkill" theory has been revived because, in the opinion of Dr. Paul S. Martin, chief supporter of the theory, "The late-Pleistocene extinction pattern leaves little room for many other explanations."

It has often been proposed that the great reptiles were killed off by more intelligent and adaptable warm-blooded mammals. This is hardly possible, for the mammals at the time the dinosaurs became extinct were small, unimportant creatures. They had lived alongside the dinosaurs for a hundred million years

and had not presented the slightest threat to the great reptiles. Only after the dinosaurs died out were mammals able to begin the evolutionary explosion that resulted in the vast array of extinct and living mammals, including ourselves. The fact is that in a century and a half, zoologists and biologists have not been able to solve the problems of mass extinctions. But now astronomers have joined the argument with ■ highly speculative but extremely intriguing hypothesis. They suggest that the frightening force that wiped out entire populations of species came from far out in space: in the explosion of a nearby star into a supernova.

Even measured on the grand scale of our galaxy the supernova is an awesome event. A star suddenly explodes, its brightness increases several million times and it throws off a prodigious amount of radiation in all directions. The supernova explosion is a rare event, although no one is sure how rare. But if a supernova exploded in our neighborhood — say two or three hundred light years from the solar system — our earth most certainly would be bombarded by a dangerously heavy concentration of cosmic radiation.

Two scientists who think that supernova explosions may be a factor in the evolution of life on earth are Dr. K. D. Terry of the University of Kansas and Dr. W. H. Tucker of Rice University. They assert that, "cosmic radiation from exploding supernova could have caused the extinction of many exposed animals, including some marine organisms, without the simultaneous extinction of plant life."

The radiation theory is attractive because it allows for selective ex-

tinction. The extinctions seem to have affected the large animals more drastically than the small ones and seemed to have little effect on plant life. Great dinosaurs stomping about the surface of the earth are more exposed to harmful radiation than rat-like mammals living in holes.

Large, slow-breeding mammals of the Pleistocene would have suffered more from a radiation bombardment than the small fast-breeding ones. Perhaps after some sort of late Pleistocene radiation bombardment, the number of large animals was reduced to unnaturally low levels and man the hunter just stepped in and supplied the coup de grace.

The statistical probability of a supernova explosion taking place nearby is hard to figure. We simply don't know enough about what causes such an event. Drs. Terry and Tucker believe that the probability of nearby supernova explosions in the past is fairly high. Other experts deny this.

Even without a supernova there is enough radiation in space to cause mass extinctions on earth. Our planet is constantly bombarded by cosmic radiation, but most of it is prevented from reaching the surface by the earth's magnetic field. However, the strength of this protective field changes.

Causes for such changes in the magnetic field are unknown. Columbia's Dr. Heirtzler attributes them to large wobbles in the earth's spin.

Whatever the causes, during the times when the magnetic field is weak the earth and the life upon it must be exposed to a high level of radiation. How high a level, and what effect it might have on living things we can only guess. It might be deadly enough to cause the mass extinctions.

Scientists are now trying to find evidence of a relationship between periods of increased radiation and periods of mass extinction. Evidence for both are contained in the rocks of the earth's crust.

Controversy over the mass extinctions will grow noisier over the next few years as new techniques for probing the earth's distant past are put into use. But there is little hope that a generally acceptable solution to the problem of mass extinction will be arrived at soon. Already, tests with gamma ray sources on desert reservations are showing that little burrowing mammals like the gopher will succumb, while surface reptiles — lizards and snakes — survive the bombardment.

Contemplation of these periods of sweeping death may serve a purpose — it may make us a little more humble about our station in life. For a long time man has looked down his nose at the dinosaurs and other extinct creatures. "Overspecialized, evolutionary dead-ends; nature's experiments gone wrong" was the verdict. Then looking into the mirror man believed he saw the great, intelligent, unspecialized, adaptable triumph of evolution — himself. Perhaps we are not all that great. Dinosaurs were around for 100 million years, the sabertoothed cats for 35 million. Man has been on earth for a paltry million years. The dinosaurs and the sabertoothed cats did not die out because they had somehow failed. They apparently died out because of some powerful and unusual forces entirely beyond their control. It would be best for us to find out what caused the waves of extinction, and to see if we can survive whatever it is, before we start patting ourselves on the back as evolutionary triumphs.

Cells that learn electronically

ELECTRONIC MEMORIES, in which information is stored for later retrieval, are now common in the technological world. But artificial nerve cells that simulate human learning and forgetting are still a novelty.

Robert P. Harris of St. Charles, Mo., was told by an M.I.T. professor that the electronic circuit for which he and two associates were recently granted Patent 3,414,735 was "the only practical item to date to have come out of studies in the field of artificial intelligence."

The practical use being made of the learning cell is in automatic medical monitoring devices. These give advance warning when abnormal blood pressure is detected in a patient under intensive care, or when improper wave forms appear in an electrocardiogram.

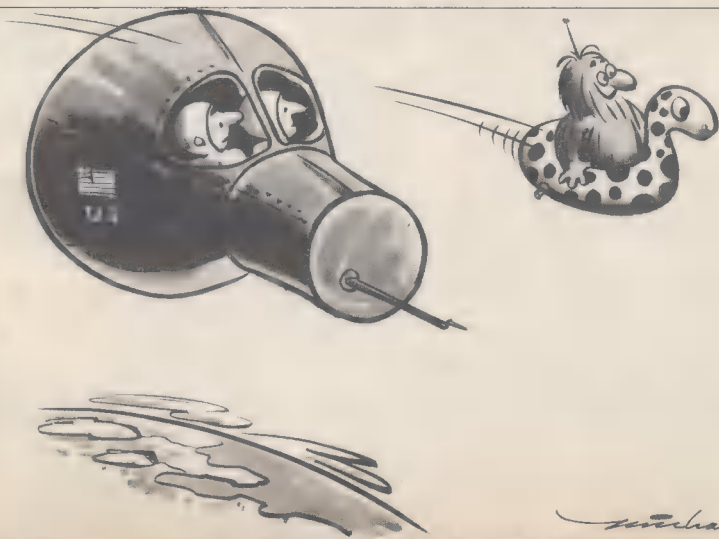
The invention is also being considered for warning equipment aboard supersonic transport aircraft, where it might monitor engine per-

formance or surface stresses.

Harris is a senior group electronics engineer for Conduction Corporation of St. Charles. His co-inventors are Michael Koenig, now a Ph.D. candidate at Washington University, St. Louis, and Dr. Jerome L. Krasner, chief engineer for a Massachusetts electronics firm.

Learning cells mechanize most of the characteristics of the human nerve cell, or neuron. They learn faster than they forget, and apply the fresh and remembered knowledge in making decisions.

The cell is an improvement over one patented in 1967 for the same company by Harris and Dr. Krasner. Harris explained the superiority of the newer one as its ability to give weight to warnings it has already issued. The cell takes account of how often and how recently it has issued cautions, like a mechanic who remembers telling a car owner about something wrong. —Stacy V. Jones



NEW FOR INDUSTRY



Light bulb is called by engineers "the most efficient compact light source known today." A discharge-type lamp similar in principle to the mercury vapor lamp, it was developed by Westinghouse, Bloomfield, New Jersey. Called "Ceramalux lamp," the bulb is small in comparison to mercury lamps. It is estimated that life of bulb is 6,000 hours.



Laser display system produces 48-inch full-color TV pictures by taking signals from a standard home set, impressing them on three laser beams and passing them through optical display devices. General Telephone & Electronics, N.Y., N.Y.

Crystal smaller than a lump of sugar (right) can store as many as 1,000 different holograms. Photographic records made through a form of lens-less photography, holograms are often used to store enormous amounts of information. Developed at Bell Telephone, Murray Hill, N.J., laser beam passes through lithium niobate crystal to project image as shown here.



Seeing through fog, blizzards and sand storms is now easy, thanks to the Gated Viewing System, developed by Laser Diode Laboratories, Metuchen, N.J. Expected to be of use in police work, fire-fighting, ambulances, highway emergency vehicles and others, Laser Diode's hand-held instrument uses infrared light to see through where the naked eye can't. The viewer may soon be used on commercial airlines.





One hundred-story John Hancock Center in Chicago is being built with a new concept based on an ancient building technique. Originally used in primitive adobe mud houses, concept is reminiscent of the bearing wall with a diagonally braced exterior column system. Principle may lead to structures as high as 150 stories, and reduces the cost of smaller buildings of from 40 to 60 stories. Design is by architects Skidmore, Owings & Merrill.

Tire-testing can now be more accurate because of Goodyear Tire and Rubber's new glass plate testing facility in Akron, Ohio. High speed camera can record rate of tire squirm when wheel is run on overhead glass window. Grooves in tire are painted white to show more clearly the rate of wear. Bicycle on plate glass testing window shows how tires are examined by engineers during rigid tests. Technician Jack Tuttle is shown setting the lens of the high speed camera.



the **FAMILY** in **CRISIS**



Is the American family as we know it in danger of breaking apart? Four Menninger Foundation psychiatrists discuss the chances for the family to survive the current period of intense stress.

Threats to the modern family



"The failure to become individualized and differentiated from one's parents is one of the greatest problems today."

Mr. Mandelbaum is the Menninger Foundation's Chief Psychiatric Social Worker.

by Arthur Mandelbaum, M.S.W.

LAST MAY I received the following letter from the chancellor of The University of Denver. It is filled with sadness:

"This letter is to inform you that this University has dismissed more than 40 students on this day. Their dismissal is the result of willful disobedience of the rules and regulations for orderly and proper conduct.

"For several days now, a small group of students has made demands and issued threats to the administration of the University. Specifically they have threatened to occupy the Chancellor's office and Administration Building, and to sit-in in other essential university buildings and to disrupt university activities.

"The issues on which these protests are based are improper, illegal and go against the orderly processes

by which institutions can and should operate. This University will not be run by threats and intimidation. It will not respond to ultimatums from students and it will not be intimidated by the pressures of groups who are dedicated to the disruption of institutions of higher learning or seek disorganization to the point where such institutions can be controlled by violence and run under constant threat of disruption. . . .

". . . In the simplest language in which I can put it, the time has come for society to take back control of the functions and its destiny. If we condone the abandonment of the rule of law in the University, we have no right to expect those who attend it and later moved on into outside so-

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Photograph by Bob Combs

Has today's youth rejected tradition, or are they actually in search of it? Perhaps the family today is finding a strikingly different form.

ciety, to conduct themselves in any other manner."

I was very moved and very troubled by this letter and the depth of feeling expressed by the chancellor; just as one must be moved by the troubled emotions of parents who are bewildered by the turbulent winds shaking family structure and threatening to topple it to the ground. In the play, *Fiddler on the Roof*, the father tells his audience, "You might say everyone is a Fiddler on the Roof, trying to scratch out a pleasant simple tune without breaking his neck. It isn't easy. And how do we keep our balance? That I can tell you in a word . . . tradition."

But what is tradition? Even that hallowed word is changed by the times. The Russian poet Voznesensky said, as he defied the world of today: "The times spat at me. I spit back at the times."

Tradition may not mean simply a way of handing down ritual from one generation to the next. Indeed, our

sensitive youth mock our tradition and see hypocrisy in it; or at least in what we deem as traditional. If you doubt this listen to the lyrics of their songs:

"And the people bowed and prayed
to the Neon Gods they made.

And the sign flashed out its
warning

In the words that it was forming.
And the sign said:

The words of the prophet are
written on the subway walls
And the tenement halls
And whispered in the sounds
of silence."¹

or

"Do people have a tendency to
dump on you.

Does your group have more
cavities than theirs.

Do all the hippies seem to get the
jump on you.

Do you sleep alone when others
sleep in pairs?

Well there's no need to complain,
We'll eliminate your pain.

We can neutralize your brain
You'll feel just fine

Now buy a Bright Green Pleasure
Machine."²

So youth rejects our tradition—or are they searching for it? And is the family in danger of destruction or is it finding new forms? In this time of great change, the roots to the past seem broken and lost and *tradition*, in the true sense, is the search for a relevant continuity with past—with what was good and had value in the past. The family and the individuals within families are searching for some

¹"*Sounds of Silence*" by Simon and Garfunkel.

²"*Big Bright Green Pleasure Machine*" by Simon and Garfunkel.

modern form of expression to fit the times, not a slight modification here and there, or a patching-up. They are trying to find in modern form—to find in the work that goes into maturity—clues to discovering one's *authentic voice*!

Tradition means the vital relationship to the past, the search for connections to the present and future so that one can achieve maturity. It is said that a child remains a child when he yields to the world, when he surrenders to it, when he is the slave of his passions and impulses, when he wishes to remain a child like Peter Pan who wanted no part of adulthood. On the other hand, for the adult the task is to take possession of the world, to master resources and thus to achieve maturity, to achieve manhood. That is the task of the family, the artistry of the family, the skill of being a parent. That sort of skill is not aimed at wiping out problems, but at mastering them as they appear, and as they must and are destined to appear.

The search for new forms is then as inescapable as the slow evolution of a child's development; but this search is inextricably woven into the substance of history, and a prisoner of it. It must simultaneously seek to escape and acknowledge it.

It is from history, a strong sense of the past, that we know our parents and ourselves. "Love is ■ chain of love," said Truman Capote, "because you can love one thing, you can love another." All children need to know who their parents are, what their past is, the history of their families, the culture and time in which they are rooted, the models on which they can rely. The family consists of guiding faces and guiding voices (Erik Erikson's terms) and it gives children not

only a sense of the past, but a sense of continuity, ■ sense of belonging, ■ sense of guidelines which can be followed through the challenges of life experiences. When parents are fairly consistently present for their child, alert and responsive to his needs, and he is somewhere within the circle of whatever major interests preoccupy his family, then the child will absorb into himself an image of his mother—and soon his father too—that will become deeply etched into his personality. The transition from one developmental period to the next during the early years is smoothed by the ever-consistent, available parents who create a sense of outer continuity, predictability and harmony which become transformed in the child into a sense of inner security. Erikson has described this as essential for giving the child an identity and a sense of inner goodness and basic trust.

Good memories help

Dostoevski said, "You must know there is nothing higher and stronger, more wholesome and good for life than some good memory, especially a memory of childhood. People talk to you ■ great deal about your education, but some good sacred memory, preserved from childhood is perhaps the best education. If a man carries many such memories with him into life, he is sage to the end of his days. And if one has only one good memory left in one's heart, even that may sometimes be the means of saving us."

And saving us it does. For with a knowledge of home in one's person, it is possible to leave home. You can go away from mother and father when you know where they will be when you choose to return. You can

learn to *walk* away from parents, to go to preschool, to kindergarten, to junior high and high school and to college—all transitional steps when you have a fairly firm grasp of who you are. And the parents can let go more easily also.

Ogden Nash defined a family as a unit, composed not only of children, but of men, women and an occasional animal and a common cold. But this is an idealized, false, homogenized image of the American family. It does not exist except in some Hollywood or TV fantasy. Families do not have such a harmonious and boring architecture, they come in all sizes and shapes; fascinating, fantastic, wonderful and quite human, unpredictable and plausible, in different genetic combinations and qualities, covering a range of varied sensitivities.

Emancipation necessary

Indeed, it is the failure to become individualized and differentiated from one's parents which is one of the greatest problems for our time. The child who clings to infantile pleasures and rejects growth, who must strive to emancipate through *revolution* rather than evolution, is the one who rejects history and negates its lessons. He repeats the failure to leave his parents over and over again, or he resorts to destroying their memory. In Wilder's play, *The Skin of Our Teeth*, a young man says to his father:

"I have no mother. Get it into your head I don't belong here. I have nothing to do here. I have no home. Nobody can say must to me. All my life everybody's been crossing me, everybody, everything, all of you. I'm going to be free even if I have to kill half the world for it. . . . It's like I

had some big emptiness inside of me . . . the emptiness of being hated and blocked at every turn. And the emptiness fills up with the one thought that you have to strike and fight and kill. Listen, it's as though you have to kill somebody else so as to not end up killing yourself. . . ."

This is a young man who cannot free himself from his parents nor they from him. Superficially they are far apart, psychologically they are stuck together with hooks of steel. This is not only a psychological dilemma, but it is caused also by a world which at times loses its coherence, its logic, its consistency: When the family breaks down as it did under slavery, in wars, revolutions, depressions, swift technological changes—so swift, indeed, that our institutions cannot keep pace—then men falter, become dehumanized and feel violated. "It is also bad social machinery which makes bad men."

In the play I quoted by Wilder, the father responds to his son by saying:

"Oh, I've never forgotten for long at a time that living is a struggle. I know that every good and excellent thing in the world stands moment by moment on the razor edge of danger and must be fought for—whether it's a field or a home or a country. All I ask is the chance to build new worlds, and God has always given us that. And has given us voices to guide us. And with the memory of our mistakes to warn us we've come a long ways. We've learned. We're learning."

So to be a parent and raise a family, and to help each individual differentiate himself and achieve a separateness, is for a parent a moral condition, an education, a career. It takes us all one step further up the evolutionary ladder.

The increasing responsibilities of the schools



"Parents . . . in many areas have abdicated traditional responsibilities and have insisted that other social institutions assume some of the burden."

Dr. Ack is on the staff of the Foundation's Children's Division and the Division of School Mental Health.

by Marvin Ack, Ph.D.

I THINK the most striking changes that have taken place in our lifetime have been the increased amount of knowledge available to us and the corresponding increase in the complexity of life. At the time of the American Revolution an intelligent man could be a classical Greek scholar, an engineer, ■ historian and a farmer all at the same time. Today engineering is divided into a number of sub-specialties and it takes years and years of study to be an expert in even a *part* of one of the sub-specialties. In the last 10 years the world's cache of facts has doubled. The amount of knowledge accumulated in the last decade equals the amount gathered in all the years of written history! This proliferation of knowledge along with the associated amplification of the complexity of the environment that man has now to adjust to, has exploded many of the simplistic beliefs once held regarding the functioning of our universe.

These changes have produced feelings of inadequacy and incompetency in increasing numbers of parents, so much so that in many areas they have

abdicated their traditional responsibilities and insisted that other institutions assume some of the burden.

The school, operating as it does as a captive social agency, has been one of the institutions most prevailed upon to step into the breach. Schools have been asked to prepare students for college, or for a vocation, to teach driver education, to institute a lunch program, to take the responsibility for after-school recreation, to teach home economics, family planning and now sex education. And then parents wonder why they can't understand how their children develop the attitudes they hold.

I wonder if this transfer of responsibility hasn't at times resulted in repercussions beyond what either the family or school anticipated. The school is saddled with assignments it is ill-equipped to carry out, the family has found its taxes increased and its children with attitudes the antithesis of what they had expected. I have often wondered whether such ■ transfer of responsibility is even possible. To me education is a mutual, cooperative endeavor. If a child gets ■ good education it is not only because he has gone through a good

school system but also because he came from a home where learning and education were valued.

Our clinical experience with children here at the Menninger Foundation indicates that until children receive parental permission to discuss sex, they cannot; and furthermore they cannot "hear" what the therapist has to say on the subject. For this reason a child therapist will seldom introduce this topic into the outpatient treatment for a child—despite the child's interest and readiness—until the patient has the approval of the home and even more, the assurance that the parents are willing to continue the discussion at home if the child so wishes. Otherwise, the children feel guilty or inhibited or both and the entire effort becomes futile.

Sex education needs

If it is true that children cannot "learn" about sex without active parental involvement, the question would then become not who shall take the responsibility in this area, but rather how can the home and school enter into an effective dialogue in this area so that an articulated program can be developed?

There is another area of educational activity which if it eventuates will have even greater repercussions on the family than any existing practice and that is what is now called preschool education. Although this is not yet a reality except for a limited number of our disenfranchised population, it is quite likely that in the foreseeable future mandatory public school education will be the law of the land for children from three on.

Research has demonstrated that by the time some disadvantaged six-year-old children enter the first grade

the sensory and intellectual deprivation they have suffered has been so great, one can predict with a high degree of accuracy which ones will be high school dropouts! And this, mind you, is prior to their first academic contact. Surely if some come destined to complete failure there must be hundreds of thousands more who enter school with limited disabilities. Obviously from an educational point of view, for these children it may be essential and imperative that the school entrance age be lowered. I feel confident that the more affluent segment of our society will soon demand the same opportunity for their offsprings.

Although it will be difficult to contest the intellectual and academic value of this experience, society will need to consider the effect of such an experience on the total development of the child. The prevailing psychological theory which guides our clinical operations with child and adult patients suggests that the major portion of the individual's personality is established prior to the onset of school. It is, of course, common knowledge that preschool children are extremely impressionable and malleable. However, we have discovered that what they have encountered in their childhood in terms of attitudes and experiences often establishes lasting, and sometimes immutable behavioral patterns. This is not to say that change does not take place after age six; of course it does, but rather the change occurs within broad but predetermined boundaries.

Now, lowering the starting age will mean that the charge to the school will be not only to impart knowledge or transmit culture, but implicitly to take part in the rearing of our children. If this eventuates, the school

will help establish values, attitudes, behavior traits and so forth. Although the ostensible function will be to educate our youngsters, they will in fact be assuming the responsibility for a share of the child's basic personality development, a function which in the past has been almost exclusively the domain of the family.

I am not suggesting whether this will be a wholesome, beneficial move or a debilitating and disastrous one. This question cannot be answered at this juncture, certainly not without knowledge of how this will be programmatically accomplished. We do

know from past experience that the results will be disastrous if this is considered just another responsibility of the school undertaken without constructive change in teacher training programs utilizing the knowledge and skills of psychoanalytically oriented mental health specialists.

There seems to me no question that the increasing complexity of our world will demand changes in the family, its functioning and sphere of influence. The questions we need to ponder, discuss and argue are what kind of change, for what purpose, and by whom?

Today's family: A balance of strengths and weaknesses



"Families . . . have moments of inadequacy, when they need each other and family members need each other."

Dr. Hirschberg is Associate Director of the Foundation's Children's Division.

by J. Cotter Hirschberg, M.D.

WE ARE ALL aware of the tremendously wide diversity of economic, social, religious, subcultural, and even role relationships within families. Therefore, when one tries to talk about strengths and weaknesses of the family as a general concept, it is extremely difficult to arrive at a

series of fundamental strengths or fundamental weaknesses that don't have their own individual variations. But nonetheless, let us consider very briefly what some of the present stresses are, and what some of the strengths are with which the family faces those stresses.

First of all, in our present transient and rapidly shifting cultural settings,

although the family itself is an intrinsically tough institution, it often has no strong sense of purposefulness beyond that of self-protection. To put it another way, it is often difficult in transient times to create within the family structure a strong, positive conviction; and yet all of us are aware of how important it is that the family be able to have a conviction about some special, basic way of life.

One result of this problem is the child's difficulty in identifying with his family, and even in identifying with the parents themselves—because they become less clear as people when they are less clear about their own inner convictions. So the sense of an ethic, or the sense of a basis for ethical judgment, is certainly more difficult for the family today.

Isolated communities

A second weakness is the fact that our families by and large are smaller and more isolated units than they were. The typical family today lives in a new community; they don't know their neighbors very well, and they are relatively non-dependent upon their own relatives. They no longer can draw on a family clan as they did in the past. In fact, many a family considers its relatives a menace, especially the in-laws. And interestingly, although traditionally the "great menace" is supposed to be the mother-in-law, the family today most often views the grandmother-in-law as their "greatest menace."

A third weakness, or stress, which the family has to struggle with is the changing role of the mother and father within the family. Now this does not necessarily mean that the role changes are not good; but who and what father is and what father

does, is less clear than it used to be.

One of the dilemmas is that father often emerges as less strong, and he certainly many times emerges as less available. He is gone more often. One of the ironies of our shorter work week is not that it has increased the amount of time father spends at home, but that it has increased the opportunity for father to have various kinds of employment.

Mother's traditional functions—keeping house, cooking, making clothes—have become secondary values today. If one tries to define mother's homemaking functions, in many families she is best described as an organizer or as an integrator. The day is a successful one for her when nothing goes wrong with the schedule. This is not a satisfying substitute for positive, tangible achievements.

With these three weaknesses—waning convictions, family isolation, and changing roles—the family is not what it used to be. On the other hand, this doesn't mean that new strengths aren't emerging in today's families.

The first of these new strengths is an increased tendency for "giving and taking" between husband and wife. This is a result of the role changes I just mentioned. The interdependence that the role changes have made necessary has really added a certain sense of strength to each of the individuals. This new interdependence adds to the closeness within the family; it

This article is condensed from a chapter written by Dr. Hirschberg to appear in *The Clergyman as Counselor* (working title) by Farnsworth, D. L., and Braceland, S.J. (Editors) to be published by the Liturgical Press for the Institute of Religion and Mental Health, St. John's University, Collegeville, Minn., this year.

brings about a growth of positive feelings through the mutuality which can come from the gratification of each partner's needs within a family.

Furthermore, neither father nor mother any longer has any premium on negative feelings. Both of them feel quite free to express anger, and anger can really be expressed more readily without the feeling that the family is going to be, in a sense, destroyed by the expression of anger. The family doesn't have to have ■ certain idyllic happiness to it that it once was supposed to have. This emergence of the ability to express feelings without endangering the family is a genuine new strength.

A second new strength is related to part of what Dr. Ack was talking about. The parents, while giving up certain roles, have also allowed their children increasing independence. Now this has had its costs. But in one sense it is like a child learning to walk: The fact that the child may fall down says nothing at all about the enormous value of his learning to walk. And the same thing has come into the strengths of the family. Parents and children are aware that "give and take" within the family requires increased responsibility and increased expectation of growth. The gradual independence, the capacity of the child himself to give something and his awareness that he has value in contributing—not just taking, not just receiving—is certainly one of the new strengths in today's families.

A third strength in our present families is the increased health that has come from the changed relationships of brothers and sisters. There used to be a clear ordinal position of siblings. Today, neither order of birth nor sex of the child interferes with or enhances the value of the

child *per se*. There is much less unnecessary separation in the social activities of the family according to sex roles, or where one comes in the family, or sibling roles.

Because of this increased health in the sibling relationships, there is a very real increase in the strength of the family. Each child has his own importance, each child has his own advantages and disadvantages which inherently add to or subtract from the value of the child.

Strengths exist too

There is no question that there are weaknesses, there is no question that there are strengths in today's families. What I really want to convey is that the probable balance between these strengths and weaknesses is always variable from one family to the next. The one thing that remains unchanged is that our culture depends upon a strong, stable family unit. None of us is so sufficient that he can't deal with the ability to add to that unit. However, none of us is so self-sufficient that he can exist without the family. It is certainly clear that no family any longer has any premium on strength or resourcefulness. And in the same way, no family *member* any longer has a premium. Families as well as family members have moments of profound inadequacy, when families need each other and family members need each other.

The value that comes out of all this *in toto* is that as we find ways to meet mutual needs, needs for the sharing of work opportunity and for the sharing of achievement opportunities, it is very clear that our family today is going to really grow in strength. Not just endure, but prosper.

Family people and organization men



"Perhaps we need to shift from a thing-oriented focus. Things have never been better; it's people in trouble."

Dr. Taylor is director of the Foundation's Division of Social Science Research.

by James Taylor, Ph.D.

WE HAVE BEEN TALKING about changes in the American family; but—like a latent theme—through this discussion has run the issue of social change. I want to expand this latent theme and talk about larger changes in American life and the impact these changes have upon individuals and families. My purpose is not to view these changes with alarm or point with pride. It is simply to suggest some of the ways in which today's large-scale processes affect the human psyche and the family process. We know relatively little about such things, so my other purpose is to suggest certain issues about which we need more understanding.

As Americans we have a tendency to think of change in *technological* terms. Sunday supplement articles about the year 2000 usually try to forecast new inventions; but about the human effects of such inventions there is a surprising silence. Surprising, because every major new invention profoundly affects society and the people who live in society. We focus more on *things* than on the *human response* to things; we have good measures of gross national product, but no measure of gross national sat-

isfaction. Perhaps some of our national unrest reflects a need to shift away from this thing-oriented focus. Things have never been better; it is people who are in trouble.

There are two kinds of social change caused by the new technological inventions. The first is the growth of what I call "super-organizations" on the national scene. The best examples of super-organizations are the vast international corporations, the modern sprawling university networks and the Department of Defense. Technologically, the super-organization is made possible by instant communication, jet transportation and the development of computers. The mark of the super-organization is not just its size, but rather its potential for efficient cooperation and flexible response. The super-organization is a means for coordinating human effort in a way never before possible.

The second kind of social change would involve the impact of television. We have already spoken of super-organizations. So you could call TV "super-entertainment." The ancient Romans had bread and circuses; we have TV suppers and "laugh-ins." There are some issues raised by TV we need to think about.

First, recent studies have shown that the average child spends more time in front of TV than in front of a classroom teacher. If education is largely a matter of communication, the impact of TV is likely to be stronger than the impact of schools. I don't really know what the implications of this are, but I think they should be thought about. The child in his family and school has a very small range of people he can imitate or that he can take as models. The TV tube has expanded his potential models a thousandfold. Teachers tell me that the younger children are more sophisticated now, in a kind of surface way. TV, perhaps?

The second possible impact of TV lies in the human effects of advertising. TV really is a medium for selling products; a great deal of money is spent finding out how to sell products best. One approach increasingly used is not to say "We have a product which scrubs things better," but to say "We have a product which reflects the kind of person you are." If you want to be a popular girl, if you want to be a successful man, if you want to be looked up to as a leader—then buy this product. Be a beautiful person, be a swinger with the girls, be an *In*-person, a *Now*-person.

Most of us take these appeals with a whole pitcherful of salt; but for people whose self-esteem is a little shaky anyhow—like the adolescent girl—they can have a very strong appeal. Remember too that many people are in deprived situations, have low self-esteem and cannot possibly afford the product. Such people get an implicit message over and over: If you can't buy this, you are worthless. Now I think this kind of message repeated day after day, week after

week, year after year, has an effect like the Chinese water torture. I think its effects might well be looked into.

However, my major theme is the effect of what I call the super-organization. Let me describe its characteristics.

In the first place, such organizations are not bound to any one spot. Many are international; most spread across and through the United States. Most middle and upper level employees of the super-organization are subject to multiple transfer; their career lines may take them anywhere. In the days of the old mercantile concerns a man might expect to make at most one or two moves in a lifetime; in the modern corporation he is likely to be here today and gone tomorrow.

Family face changes

This mobility has profound effect upon people and their families. The face of the family is changed. Kinship ties are disrupted: Grandparents are in one spot, children in another, aunts and uncles, cousins and kissing kin elsewhere still. At a personal level, the patterns of relationship between people change. In the stable and settled community, with the family extending generations into the past, who you were was linked with who your family had been, and what you had done as perceived by people familiar with you from childhood.

In today's more mobile world of the organization man, this extension of the self into the past is diminished. Your colleagues know who you are largely from the way they have seen you behave over a short time period. The emphasis comes to be not upon what one is as known over a long life term, but rather upon what one can

do, what one can achieve. We speak increasingly of "social skills," and decreasingly of "strength" or "character." Impressions are made more quickly, and in less depth. As a result of this fluidity, the way is more open for personal change; and personal fulfillment may be easier. You aren't stuck in the old ruts you had. On the other hand, the way is also open for uncertainty as to who one is or might be, alienation is more easily possible, and a stable sense of identity is more difficult to maintain. For the children of such migratory families, change is very much a part of life. At its best, this can produce growth; children can rise to new challenges and develop new skills. At its worst, it can create developmental havoc.

Organization vs. individuality

The super-organization is designed to function efficiently; it does this by bringing people together in cooperative endeavor. Competition and aggression are allowable and encouraged, but always with certain limits. Even at the higher echelons of the corporation only some options are open; people become specialists. For the most part, the rewards go to *adaptable* specialists, but specialists none the less. If cooperation is to work, the rules of the game have to be well spelled out and accepted. Cooperation and smooth functioning requires that the unique and disruptive idiosyncracies of individuals be smoothed off. I am not saying that all individuality is lost; but rather that the grand efflorescence of individuality would today be disruptive. For an example closer in time, I suspect that the highly individual genius of our own Dr. Karl Menninger would

not fit easily into the Department of Defense or the administration of the University of California.

The push then is for a more standardized man — adaptable, capable, ■ good team member. The emphasis on efficiency, and on competitiveness within bounds has led to increasing professionalization and standardization of human skills. In many ways the universities and graduate schools act like the meat inspectors for the U.S. Department of Agriculture. In my own field, a Ph.D. from Harvard or Michigan is prime, an M.A. from the University of Kansas is standard, and ■ high school dropout is a cull. Diplomas are like small round indelible stamps which guarantee ■ relatively standardized product. This again serves the social good, but it has its costs. Most of the middle class is processed until age 20. Professional education and training processes can go on for many more years. During this time the person makes choices, true, but does not feel as if he is doing and accomplishing things. Rather, he feels as if things are being done to him. Some choices and failures are almost irrevocable. I can remember seeing a small and only half-humorous sign which put it better than I can: "Choose your rut with care, you will be in it a long time."

A second cost lies in the fact that with this system *unexpected* routes to social achievement and reward become less possible. There was a real social advantage inherent in the Horatio Alger myth: that with luck and pluck, grit and determination, any good Christian lad could make a million dollars. This is different than saying that with a ■ average, support through college and an ability to tolerate infantilization, any reasonably

Today's child is anxious to get into the proper rut. The family makes sure he does.

intelligent lad can achieve affluence and a pleasant cellophane-wrapped house in the suburbs. You are in ■ different ballpark. Note that even this route is single; there is no guiding ideology about people who have started pushing ■ broom in the mailroom of IBM and emerged as president of the organization or as chief engineer for the technological division.

These new facts of social life have an increasingly hard impact upon minority group members who typically do not just want jobs, but jobs that go somewhere, jobs on which they can build some sense of pride and identity. Such jobs are increasingly rare. And it is hard to be a failure in an affluent society, especially when hope is missing and when the impacts of the mass media say you should be more than you are.

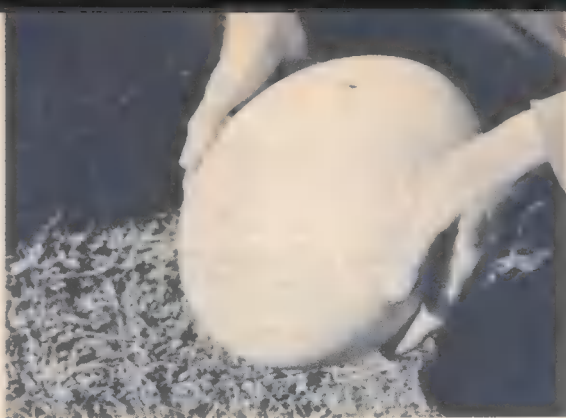
I suggest that these facts produce certain personal strains and certain strains on the family.

The old adage says, "like father, like son." This reflects the fact that in raising children people reflect not only their own childhood experiences, but also the lessons of their own lifetime. They raise their children towards the goals that they have or wish to achieve, and in terms of the expectations that they themselves have developed. Thus the modern family of today is more permissive, more apt to emphasize social skills, more apt to value a certain flexibility. With this emphasis, there inevitably arises a certain other danger: for if one is guided only by what others say, rewarded by what others do and judged in terms of what one can accomplish

rather than what one is, what direction can life have? Much was wrong with the old rigidities of child-rearing, but at least they tended to produce a consistent self and an identity which guided the person through life. The guiding star now tends to be towards the grading machine. The child is anxious to get into the proper rut, the family is anxious to make sure he does. In this setting, failure may be catastrophic; the way is open for complete withdrawal and alienation. Pressures build up in a way unknown to any previous generation. Especially is this so when the choice lies for many between continuing education with all the infantilization it involves, or potential death in unpopular war.

A closer look needed

Let me backtrack a little. I have sounded more sure about some of these things than I really am. I have been talking about issues which are vitally important, but which are not well understood. One has to extrapolate because we are in an unknown area. We need ■ closer, and at the same time more wide-ranging look at the social forces which surround us, and which determine the diverse forms of our psyche as surely as the ocean habitat determines the multitudinous forms of all the creatures in the sea. One great potential of the Menninger Foundation is that here we can bring together knowledge of society with our clinical knowledge of man, in an attempt to work jointly towards increased understanding and more effective action.



Australia's

by Harry Butler

FOR SIX YEARS, the Western Australian Museum in Perth has had a giant embarrassment on its hands in the shape of an egg almost a foot long. Found by a farmer in the 1930s on Australia's south coast, the football-sized egg baffles scientists who study it. They report that it is, indeed, an egg and a bird's egg, but beyond these meager facts they're not willing to venture.

There are good reasons for their caution. Australia is the home of a giant bird, the emu, but emu eggs are relatively small—only about one-thirteenth as large as the giant egg. There is a giant extinct bird that lived until fairly recent times and laid eggs as large or larger than the Australian egg, but this huge creature, the *Aepyornis*, is known only from the island of Madagascar off the east coast of Africa. Madagascar is some 4,000 miles west of Australia.

Since the embarrassing egg itself doesn't yield much information, the circumstances of its finding have become even more important, and that

event concerns me, in a way, because it was largely through my own efforts that the incredible egg wound up where it is today. Due to an ordinary string of circumstances, I got the story—and the egg—from a farm family living near Nannup, about 250 miles south of Perth. In 1962, I visited the Roberts family at their colonial homestead on the Blackwood River. After tea, Jimmy Roberts, the son of the family—who knew me as an Australian naturalist who collects specimens for the American Museum of Natural History in New York—casually rolled an enormous egg across the floor toward me.

"What do you think of this?" he asked.

I gasped and goggled properly. "What is it?" I asked.

"Oh, it's something my other lad, Vic, found on the coast a long time ago," answered Mrs. Roberts. I knew that Vic had been a geology student at the Western Australian University at one time, and quickly put other questions to Jimmy and his mother. "It's nothing to get excited about," they assured me. "We've had it since

An egg 11½ inches long isn't an easy thing to ignore, and it also isn't an easy thing to identify, as scientists are discovering, a bit to their chagrin. They've gone so far as to say the egg belonged to a bird, but what kind of bird is another question—and a difficult one.

embarrassing egg

1930." They couldn't let me take it away, however, as it belonged to Vic who was down on the coast. But they assured me he'd probably give it to me if he were asked. "No use to him," pointed out Jimmy.

Mrs. Roberts, an ex-schoolteacher, explained that at first she had put the egg in the school display at Darra-dup, the community in which the Roberts farm was located, and had written to the Perth Museum about it. "But the answer was for us to bring it up there, and in those days a 250-mile journey was expensive. So my daughter Ilsa took photographs of the egg with a hen's egg and a wedge-tailed eagle. But even then the reaction was still to 'drop in sometime,' and so we kept it."

Naturally I refused to let the matter drop there. Back in Nannup, I lost no time telephoning Dr. Ride, director of the Western Australian Museum. Dr. Ride advised me to tell him about the egg when he was back in Perth. Before I managed to see him, the director mentioned the egg to several people and discovered that rumors of a giant egg had circulated

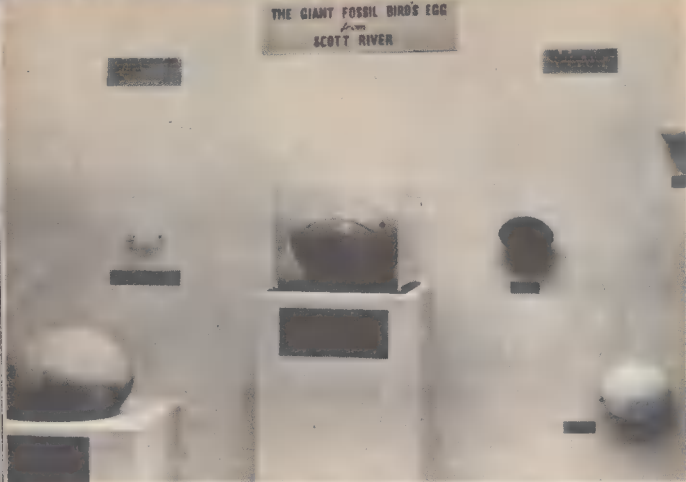
for some years, but that no one had taken them seriously.

This time, someone did. After hearing my account, Dr. Ride went south to Nannup with me the following weekend. One look and he was convinced of the egg's importance. He and I, accompanied by the carefully-wrapped and crated egg, set off for Milleannup, where Vic was living. The farmer readily gave Dr. Ride his permission to have the egg on "permanent loan."

The three of us then set out for the sandhills where Vic had discovered the egg 30 years before. We found the skeletal remains of kangaroo, dingo, a marsupial called the quokka, brush wallaby, possum, ringtail and even a human or two but no traces of ■ giant egg or bird.

In camp, Vic told us about his discovery. "One day in the early 1930s, I was hunting cattle on this property with my chum, Chris Marris. We left our horses tied and started poking around for tracks. Suddenly I saw the egg just lying on the sand. We ran over and picked it up. It was very heavy and Chris wondered if I

THE GIANT FOSSIL BIRD'S EGG
From
SCOTT RIVER



Australia's embarrassing egg, discovered over 35 years ago, has been on exhibit in the Western Australia Museum in Perth for six years, identified only as The Giant Fossil Bird's Egg From Scott River.

would get it back to the horse. I reckoned it was about 300 yards so it would be O.K. Just nearby were some pieces of skeleton and a skull, a very large skull with a beak on it, but the egg was what I wanted so I left it at that and we took the egg back to the truck. Mum was pretty excited and said that it looked like an *Aepyornis* egg."

The Roberts didn't return to the spot where they had found the skull for six or seven months and by that time the skull was gone. About three years later, however, Vic Roberts was shifting cattle out of the summer feed when, he reports, he came across a big skull with a beak. He had actually lifted it up when one of his companions needed help with the cows and he laid it down. He never found it again.

When we brought the giant egg back to Perth, it made headlines all over the world. Two reporters from the Westralian Newspapers asked me to take them to the site of the find. As we were starting back, Jimmy Roberts, who had been on hand, told us: "There are supposed to be some

old footprints in stone over here somewhere." After some searching, we found the tracks on an acre of soft, flat rock about five miles north-east of the egg find site. I recognized some of the tracks as those of emu, kangaroo, quokka, duck and heron. Others, however, were unidentifiable: curves like a scimitar blade, crosses, parallel lines—and four-toed bird tracks of a size that could have belonged to a bird capable of laying an egg a foot long.

Subsequent visits to the area produced no further evidence to clarify the egg's origin, although interesting specimens ranging from fragments of emu eggs to marine mollusks turned up.

Were the four-toed bird tracks those of the giant bird that laid the giant egg? Like the scientists who have examined the egg at the Western Australian Museum, I can't venture a definite answer. But I can offer some interesting possibilities.

First, the facts are these:

(1) It is a bird's egg, 11½ inches long, 8½ inches wide, 6½ litre volume. It is not a water-worn boulder,

a shark's egg or other misidentification.

(2) The discovery site is in Aeolean dunes on the south coast within 500 yards of the sea. The find was witnessed.

In light of these facts, here are the possibilities:

(1) The egg belonged to an extinct Australian bird of Pleistocene time, a hypothesis borne out by the footprints, the possible skull and egg fragments of a similar type reported found in Queensland and South Australia.

(2) It is a Madagascar Aepyornis egg, either drifted or carried across the Indian Ocean and left on this drift area. Madagascar was the base for French whalers and sealers operating on the southern coast in the early days of Australian settlement and a sealer could have an Aepyornis egg from Madagascar in his possession. If for any reason the egg was jettisoned or lost overboard, it would

be likely to float and drift ashore. The Indian and Southern Oceans meet in the immediate area of the egg find, and much drift material does come ashore there.

As for the skull and footprints, the finding of the beaked skull was witnessed, too, and the large, four-toed footprints are contemporary with those of such recognizable modern fauna as the emu and kangaroo. The skull, I suggest, may be either the skull of a bird similar to that which laid the egg or it could be the skull of one of the strap-tooth whales, since marine material has been found in the deposit. The prints may be those of a large extinct bird or they may be part of an aboriginal petroglyph, or carving, corroded with age.

And there, at present, the case of the embarrassing egg rests. New evidence may turn up that will clinch matters for one of these possibilities—or that will indicate that an entirely new explanation is correct.

Fossil tracks found near discovery site include four-toed tracks that belonged to a very large bird.



Cold and cholesterol

by Arthur J. Snider

THE nay-saying medics who forbid so many foods that appeal to the taste buds are throwing up a red flag on still another. Cola drinks, among the most popular beverages in the United States, are reported to elevate free fatty acids in the blood stream. Fatty acids are compounds that



make up dietary fat. When floating in the blood serum, they have been associated with an elevation of cholesterol. An elevated cholesterol is said by many authorities to increase the risk of hardening of the arteries and heart attacks.

The warning on cola drinks comes from Dr. Samuel Bellett, cardiologist

at Philadelphia General Hospital. Two years ago he indicted coffee as an elevator of free fatty acids, explaining that the caffeine in coffee acts upon the stored fat in the body, breaking it down to free fatty acids.

Cola also contains caffeine and acts in the same way as coffee. The average caffeine content in a 16-ounce bottle of cola is about that of a cup of coffee (100 milligrams).

Caffeine also increases the production of adrenalin, a hormone secreted by the adrenal glands in response to stimulation. "Caffeine has a stress effect," the cardiologist says. "It has been shown that there is an increase in free fatty acids in response to adrenal secretion.

Dr. Bellett also has found a difference between cola beverages containing natural sugar and the "diet" or sugar-free colas which use a sugar substitute (cyclamate). The sugar-free cola elevates free fatty acids much quicker than sugar-containing cola.

"Sugar will actually decrease free fatty acids for about 90 minutes," he points out, "but after the protective effect of sugar wears off, the level will bounce upward. We intend to investigate the temporary preventive effect of sugar. We also must consider whether sugar may have some other deleterious effect."

Storing varicose veins

Varicose veins removed at surgery can be stored in the patient's own

body and used later as a replacement for diseased arteries. Scientists at Rochester, N. Y., have stored veins in dogs and found them to be well

preserved after ■ year.

Although tubes made of knitted synthetic fibers are widely used as substitutes for damaged larger arteries, Dr. Donley G. McReynolds and his associates at the University of Rochester find that living vein tissue from a patient's own body is the ideal material for reconstructing the smaller peripheral arteries.

He said ■ good storage vault is just under the skin in the patient's thigh. In trials with human patients undergoing routine varicose vein removal, the vein was flushed, distended with salt solution and stripped of exterior fat and fibrous tissue. The vein then was folded once and inserted into a tunnel reached by incisions in the groin and upper thigh. Wounds healed well and no complication occurred in the 25 patients followed for up to 16 months. One vein was removed for study after five months of under-skin storage and found to be in a condition similar to freshly removed veins.

Masterpieces record disease

Mona Lisa's inscrutable smile often causes observers to overlook the fact that she had no eyebrows. Dr. Leon Goldman of the University of Cincinnati says the likely answer is the custom of the times. Many women shaved their eyebrows and Leonardo da Vinci's subject may have been following the fad. It is not likely that da Vinci's model was suffering from ■ skin disease called alopecia, says Dr. Goldman, ■ skin specialist.

On the other hand, many illnesses which plague mankind have been identified in paintings, sculptures and

ceramic works of the masters. Rodin's "The Thinker" has bunions on both feet. The rosy flush in the models of Renoir's works can be inter-



preted as a sign of illness, according to Dr. Goldman. Art of the middle ages and the renaissance, in particular, shows warts, fungus infections, skin cancers, syphilis, leprosy, bee stings, snake bites, unusual pigmentations and varicose veins. Even art of the ancient Greeks, whose works are generally characterized by good health and hygiene, show various skin disorders.

Should doomed be told?

In the continuing medical debate over whether or not a patient should be informed he is going to die, the late Dr. Charles W. Mayo voted in favor of discrete silence.

In his autobiography completed just before his death in an auto ac-

cident, Dr. Mayo said his reasoning is this:

"There is always a time no matter how ill a person is when he is left alone. It may be only for moments but it happens. For a person aware of dying, those solitary times are a horror; if it is at night, the desolation is worse. I therefore would rather that a patient with little time left be kept in ignorance of it."

Dr. Mayo believed fear kills. "I have had patients who died of pure fear," he wrote. "Before their operations they would appear to be in the grip of utter horror, weeping that they knew they could not live through surgery. Very occasionally, such a person died on the operating table. A few others died shortly after the operation. In both instances the necropsy failed to disclose any obvious cause of death."

Son of a co-founder of the Mayo Clinic, he believed that doctors should not try to decide alone when to discontinue intravenous feeding and oxygen in a dying patient but should consult with other doctors. It becomes a "charitable act" to let the patient go naturally when he is "alive" only to the degree that he breathes and has a heartbeat but no brain activity.

Kidney donors decide fast

People who donate their kidneys for transplantation to others make the critical decision almost immediately on being asked. They do not seek further information or ask for time to think it over. This surprising fact emerged in a study of 12 kidney donors at University of Wisconsin.

Dr. Carl H. Fellner interviewed

the donors five weeks and 18 months after they had sacrificed a kidney. Two were mothers, the rest were a brother and sisters.

"We wondered at what point in the long, drawn-out process that followed the first phone call that the doctors were considering a kidney transplant did the donor actually make his decision," Dr. Fellner said.

"Did he hold off, seek information, consider the facts and make an informed decision at the end, when all studies were completed and he was asked by the doctors to give his informed consent? The answers were surprising. It appeared that not one of the donors weighed alternatives and decided rationally. Eight said they made the decision immediately when the subject of the kidney transplant was first mentioned."

The other four said they went along with the tests that followed, hoping it would be someone else. Yet they never considered refusing. As it became clear toward the end of the selection process they were going to be the person most suited, they committed themselves to it, even before the final session with the doctors.

Once the decision was made, the donor carefully refrained from considering further data or consulting with his spouse.

"One of the subjects compared it to volunteering for a dangerous mission during the Korean war—disarming an unexploded bomb to save the lives of comrades," the physician said. "A sister compared it to giving birth to a child. Two mothers who had donated kidneys to a son seemed to feel, as one put it, 'Something had to be done and mothers do more for their children ordinarily anyway. It was not such a big thing.'"

The widely-prevalent idea that donors "give up something and get nothing in return" was refuted by the feeling of self-esteem that they developed. All commented that they felt "good," "noble," "bigger," "happier."

Definition of death

The heart transplant era is provoking fears among some people that they might be buried alive, a University of Missouri physician finds. They are reading about sophisticated new ways of determining death, such as brain wave inactivity, even though the heart and lungs are viable. They are becoming confused and worried over premature burial.

Dr. John D. Arnold questioned people at random and discovered 69 percent had been thinking about the diagnosis of death, particularly since the introduction of transplants.

"The public thinks of death in terms of cardiopulmonary function," Dr. Arnold writes in the *Journal of the American Medical Association*. "Two-thirds of the individuals surveyed thought that death occurred when the heart stopped or breathing ceased, or both. Only nine per cent thought of death in terms of irreversible cerebral function."

Checking history books, Dr. Arnold found there have been other periods when the public was concerned over being declared dead prematurely. In most cases, the concern arose when reports were published that a corpse was awakened as the first shovelful of earth struck the coffin lid.

A Russian count once invented life-signaling devices that would be

placed in the coffin. In Germany, "waiting mortuaries" were established to receive the certified dead until evidence of tissue decay was apparent.

Unlike the situation in the 19th century, the 20th century practice of embalming persons pronounced dead has served to remove any mistakes from public view, says Dr. Arnold. This concern may have been one of the factors leading to the introduction of embalming.

The hypnotic type

Do you find yourself living emotionally in a book you read or a movie you see? If so, you'll make the



best subject for hypnosis. About 99 percent of people are hypnotizable, but only 10 to 15 percent are capable of deep hypnosis, according to Dr. Frederick P. Zuspan, chairman of the obstetrics department, University of Chicago.

Dr. Zuspan cautions there are people who should never be hypnotized. He condemned stage performers who hypnotize people in the audience. Stage hypnotists are unable to distinguish the neurotic or psychotic patient whose defenses can be overwhelmed by forcing entry into his unconscious mind.

Users of narcotics are poor subjects for hypnosis because they cannot concentrate.

Teen medical advisors

Dr. James H. Hutton, Chicago physician, has the three most unusual consultants in the country. They're teen-agers. He is 85. He pays them for their insights and advice to help him understand young people and their problems.

"Lack of communication with persons of different ages is one of the problems we physicians face often," says Dr. Hutton. "With young patients, matters are even worse."

All the consultation is done by mail. The girls write him about their lives, those of their friends and at times reply to a question Dr. Hutton throws at them. For example, when he solicited their opinion on handling of obese girls, one consultant replied:

"Explain that she isn't the first girl to try to lose so much. If other boys and girls can do it, so can she. Ask her about her favorite movie star. If there is a slim movie actress she admires, then the girl may subconsciously want to be like her."

Another said: "If she gets hungry, tell her to get on the phone and just small-talk with someone. A diary might help. She could write down all her frustrations and fears,

and by doing so she would be helping herself to see them clearly."

Built-in virus-fighter

The human body has its own virus-fighting system. In many illnesses, however, the system does not produce enough anti-viral substance, interferon, to overcome an established infection. For some time, scientists have been searching for a substance that would stimulate production of greater amounts of interferon in the body.

At the National Institute of Allergy and Infectious Diseases, Dr. Samuel Baron and Dr. John H. Park now have been able to cure rabbits of a viral eye infection by treating them with ribonucleic acid (RNA). They found RNA stimulates the body's interferon system to produce greater-than-normal amounts of antiviral substance.

Treatment begun as late as three days after inoculation of the rabbit's eye with virus brought recovery from the severe and often fatal infection known as herpes simplex keratoconjunctivitis. The finding strengthens the hope that interferon may be useful in treating viral infections in man.

Viruses are known to cause many human diseases, including influenza, the common cold and possibly some forms of cancer and leukemia.

RNA is a chemical found in all human cells and is involved with transmission of genetic characteristics of the individual. Synthetic RNA is a simulated genetic material.

The findings must be extended to other virus infections, Dr. Baron said, to establish conclusively the therapeutic role of interferon.



Finding the Greek city Sybaris meant uncovering retaining wall of Thurii (city which replaced Sybaris). Pumps were necessary to drain hundreds of gallons of water a minute to prevent refilling.

Sybaris revisited

SPECTACULAR RUINS of the Greeks' glamorous city of Sybaris, lost for some 2,500 years, have been located by *University of Pennsylvania* archaeologists, using a highly sensitive new device, the cesium magnetometer (*Science Digest*, Aug. 1968).

The magnetometer, a sensitive magnetic detector, can locate objects 20 feet below the surface and indicate their composition. It showed that the buildings of Sybaris lie 15 to 18 feet below the plain of Crati in Calabria, Italy, about a mile inland from the Ionian Sea. The discovery climaxes a 100-year search for Sybaris, conducted most recently by

the university and the Italian Department of Antiquities.

Known to the ancients as a pleasure-loving, decadent city, Sybaris gave rise to the word Sybarite—a person who loves luxury and pleasure. It was the biggest, wealthiest Greek city of its day, not exceeded even by Athens. In 510 B.C., invaders from the nearby Greek city of Croton conquered Sybaris. According to one ancient authority, Strabo, the city was submerged when the invaders diverted a river over it.

The findings of the cesium magnetometer have been confirmed by drill cores containing bits of roof



Cesium magnetometer, a magnetic detector easy to hold and operate, was used to locate the lost city of Sybaris. It showed that the buildings were 15 to 18 feet below the plain of Crati, Italy, solving a 100-year-old mystery.

tile, pottery and stone foundations from the Sybaris era. Drill and magnetometers have outlined the foundation walls and probable columns of buried buildings.

Essentially, the evidence shows, there is one level of occupation at 4.2 to 4.5 meters below the ground, terminating in the late sixth century B.C. The foundations of major build-

ings have been traced at this level. Pottery alone has been found south of this site, and still further south there is evidence of three distinct periods of occupation. In all, the occupied area covers 2½ square kilometers.

Archaeological evidence of the presence of Sybaris below the plain of Crati agrees with most ancient accounts of the city, according to Dr. Froelich G. Rainey, director of the university museum. "Ancient writers are mostly agreed that Sybaris was built between two rivers, the Crathis and the Sybaris," he says. "The 1968 drilling probes identified ancient river beds to the north and south of the archaic remains which tend to confirm these written accounts."

The Sybarites apparently got their reputation for decadence from laws such as those banning noise-producing craftsmen and roosters from the city, and requiring that ladies be given a year's notice before attending any public ceremonies so they would have time to buy finery. They are also given credit for inventing steam baths, chamber pots and the first copyright system, which was devised to protect culinary delicacies.

Life on Venus

A chemist, a physicist and a botanist at the *University of California at Los Angeles* think that a primitive algae might be able to exist in the inhospitable atmosphere of Venus.

The recent Russian space probe of Venus reported equatorial surface temperatures of 540° F., more than 90 percent carbon dioxide in the atmosphere and an atmospheric pres-

sure 20 times that on earth. Later data from other sources put the temperature at almost 1,000° F. and the pressure at 100 times that of earth.

Dr. Willard F. Libby, chemist on the UCLA team, thinks these high temperatures may be in the equatorial belt of Venus and that ice caps may cover the poles and one-fourth to one-half of the entire planet.

If this were so, he says, the hot

belt and the cold belt might merge in a transitional zone of moderate warmth that could support plant life.

What about that 90 percent carbon dioxide? Plants on earth have not survived concentrations above 60 percent. Dr. Irene Aegerter, the team's physicist, and Dr. Joseph Seckbach, the botanist, have found algae that exist even in a 100 percent carbon dioxide concentration. One algae, *chorella vulgaris*, grew slowly but steadily in their lab for 2 months, a period equal to the Venus day.

That barnyard chicken flavor

The flavor of a poultry dish like fried chicken may depend not on your culinary skill but on bacteria present in the bird, say food scientists at the *University of Wisconsin*. The cleaner the bird, the less tasty. The Wisconsin researchers raised three groups of chickens, one germ free, one exposed to just three bacteria and the third reared under barnyard conditions. The first two tasted less "chickeny" than the last.

We're all dirty birds

Taking showers or baths may make you feel clean, but they remove no more than seven percent of the bacteria from your body, claims Dr. Ralph C. Richards, a professor of surgery at the *University of Utah Medical Center*. Scrubbing the skin with a brush or cloth may make things worse since the irritation may invite greater bacterial invasion.

In fact, if you don't bathe at all, you may be better off with regard to

bacteria because body bacteria counts reach a given point and level off. After studying campers and hikers who stay in the field for a week or two without bathing, Dr. Richards found that their bacterial counts were lower at the end of the week than at the beginning.

Bacteria counts vary tremendously from person to person, but the face is always the dirtiest skin surface. It is between 100 and 1,000 times dirtier than the chest and particularly the back. The latter is almost sterile.

What to do to keep clean? For surgeons, Dr. Richards recommends "70 percent ethyl alcohol" applied to the hands for one minute. But he doesn't expect any immediate changes in the average American's hygiene habits. "We are the washingest people on earth," he says.

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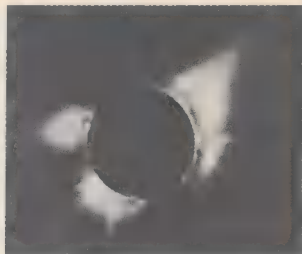
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Each month Dr. Isaac Asimov chooses one of the questions you send in to answer. He does not make the job easy on himself, for in past months he has written about such things as relativity, parity and the basic nature of light. Following Dr. Asimov's answer are the answers to some of your other questions written by regular members of the *Science Digest* staff.

Imaginary numbers

What are imaginary numbers?

There are two kinds of numbers that most of us are familiar with: positive numbers (+5, +17.5) and negative numbers (-5, -17.5). Negative numbers were introduced in the Middle Ages to take care of problems like 3 minus 5. To the ancients, it seemed impossible to subtract five apples from three apples. The medieval bankers, however, had a clear notion of debt. "Give me five apples. I only have money for three, but I will owe you for two." This is like saying $(+3) - (+5) = (-2)$.

Positive and negative numbers can be multiplied according to certain strict rules. A positive number multiplied by a positive number gives a positive product. A positive number multiplied by a negative number gives a negative product. And, most important, a negative number multiplied by a negative number gives a *positive* product.

Thus: $(+1) \times (+1) = (+1)$; $(+1) \times (-1) = (-1)$; and $(-1) \times (-1) = (+1)$.

Now suppose we ask ourselves: What number multiplied by itself gives us +1? Or, to phrase it more mathematically: What is the square root of +1.

There are two answers. One is +1, since $(+1) \times (+1) = (+1)$. The other answer is -1 since $(-1) \times (-1) = (+1)$. Mathematicians put this in their own shorthand by writing $\sqrt{+1} = \pm 1$.

Let's go on and ask: What is the square root of -1?

Here we are stuck. It isn't +1, because that multiplied by itself is +1. It isn't -1, either, because that multiplied by itself is +1, too. To be sure, $(+1) \times (-1) = (-1)$, but that is the multiplication of two *different* numbers and not a number multiplied by *itself*.

So we can *invent* a number and give it a special sign, say #1, defining it as follows: #1 is a number such that $(\#1) \times (\#1) = (-1)$. When this notion was first introduced, mathematicians spoke of it as an "imaginary number" simply because it didn't exist in the system of

numbers to which they were accustomed. Actually, it is no more imaginary than the ordinary "real numbers." The so-called imaginary numbers have carefully defined properties and can be manipulated as easily as the older numbers.

And yet because the new numbers were felt to be "imaginary" the symbol "*i*" was used. We can speak of positive imaginary numbers ($+i$) and negative imaginary numbers ($-i$), whereas $(+1)$ is a positive real number and (-1) a negative real number. Thus, we can say $\sqrt{-1} = \pm i$.

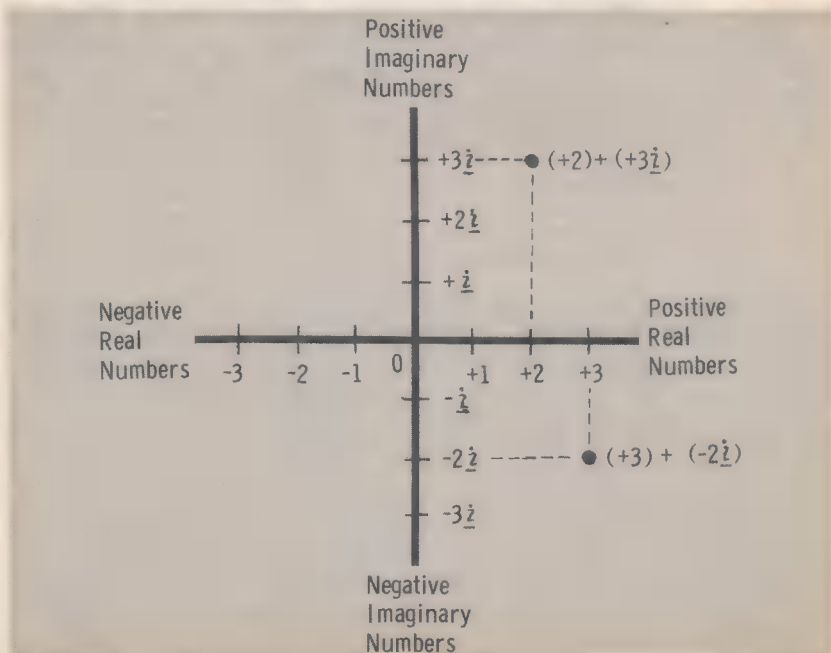
The system of real numbers can be exactly matched in the system of imaginary numbers. If we have $+5$, -17.32 , $+3/10$, we can also have $+5i$, $-17.32i$, $+3i/10$.

You can even picture the imaginary system of numbers.

Suppose you represent the real number system on a straight line with 0 (zero) in the center. The positive numbers are on one side of the zero and the negative numbers are on the other.

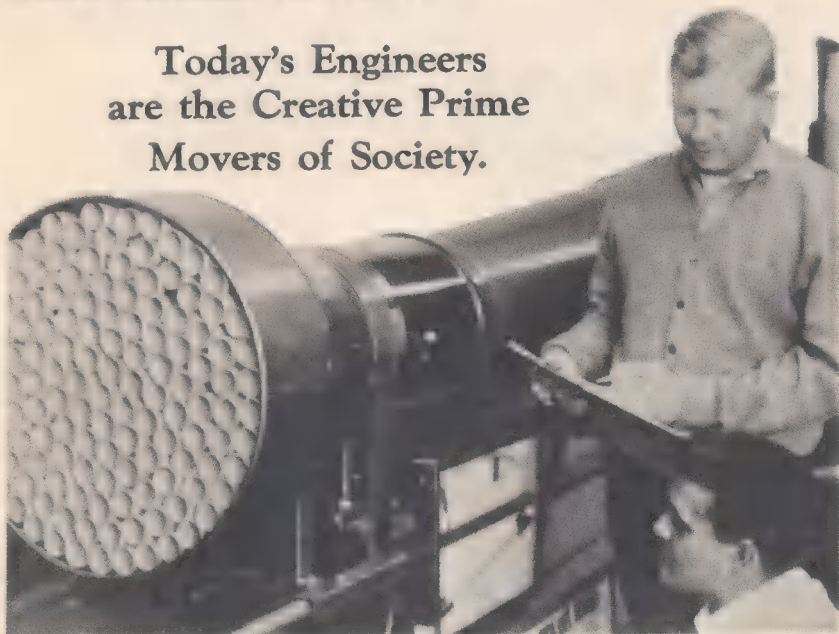
You can then represent the imaginary system of numbers along another line, crossing the first at right angles at the zero point, with the positive imaginaries on one side of the zero and the negative imaginaries on the other. Numbers can be located anywhere in the plane by using both kinds together: $(+2) + (+3i)$ or $(+3) + (-2i)$. These are "complex numbers." (see below.)

Mathematicians and physicists find it very useful to be able to associate all the points in a plane with a number system. They couldn't do without the so-called "imaginary" numbers.



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QUIZ

How good a geologist are you?

by John and Molly Daugherty

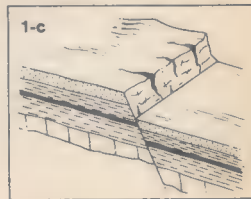
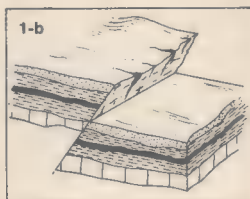
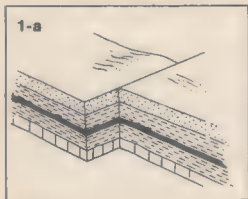
GEOLGY, THE SCIENCE OF THE EARTH, includes both physical and historical geology. Its branches are many: mineralogy, paleontology (life of past geological periods), oceanography, land forms and others.

Geology is so broad in scope that other fields of knowledge are basic to it. These include physics, chemistry, biology and astronomy.

How good a geologist are you?

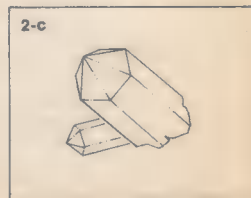
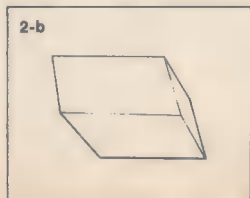
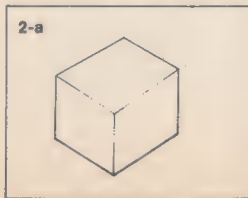
1. A fault is a tilted fracture in the earth's crust. Along the fault line, compressional (squeezing) or tensional (pulling apart) forces in the earth's crust cause abrupt movements in the crustal blocks. There are three main types of faults: normal, thrust and strike-slip.

Choose the picture that shows a normal fault.

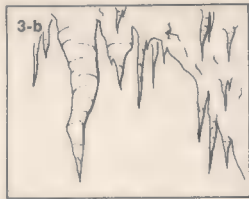


2. Minerals have a definite chemical composition. One clue to the identification of certain minerals is the geometric shape of their natural crystalline form.

Choose the picture that shows a clear calcite crystal.

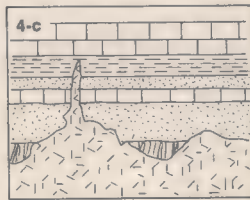
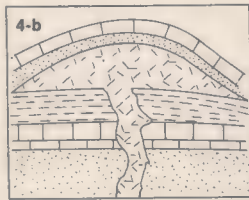
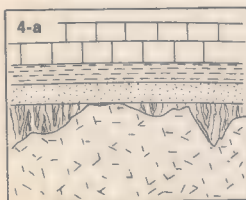


3. Stalactites, stalagmites and helictites are speleothems, formations in caves. Which picture shows the one which seems to defy the Law of Gravity?



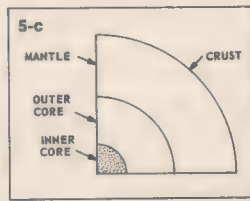
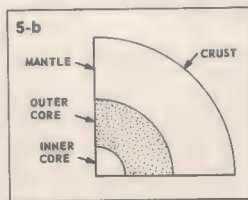
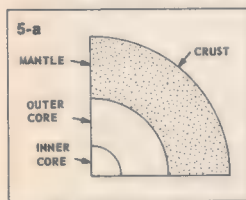
4. Igneous rock forms from molten material called *magma*. When magma cools under the earth's surface, various intrusions form such as sills, dikes, laccoliths and batholiths.

Choose the picture which shows a batholith.



5. These pictures show a cross-section of a quarter of the sphere of the earth. One part of each picture is shaded.

Choose the picture which is correct for that part of the earth which is liquid.



Answers:

1—c A normal fault. Tensional forces caused the right-hand crustal block to slide downward and the left block to rise. Movement along a fault line causes earthquakes.

In 1—b compressional forces caused the left-hand block to move upward and over the right-hand block. This is a thrust fault.

1—a is a strike-slip fault. The various forces in the earth's crust caused a strain which eventually resulted in a movement of the right-hand block

in one direction horizontally and the left block in an opposite direction. The well-known San Andreas strike-slip fault in California is more than 500 miles long.

2—b Clear calcite, which is named Iceland spar. It has the property of double refraction. When you look through a crystal of Iceland spar at a printed word, you see two images of the word. The geometric shape of the crystal is rhombohedral.

In 2—a the white crystal with its cubic shape is rock salt. Galena, an ore of lead, also has a cubic shape, but it is opaque with a metallic luster.

In 2—c the natural crystal is clear quartz with its characteristic hexagonal shape.

3—c Helictites. They curl and twist grotesquely, showing abrupt directional changes during crystal growth. These changes may be horizontal, upward or downward. Helictites are a special type of stalactite.

In 3—b stalactites grow from the cave ceiling.

In 3—a stalagmites grow up from the floor of the cave.

Stalagmites and stalactites form as solutions of calcium bicarbonate drip through the ceilings of caves. As the droplets fall some evaporation occurs and removes some of the dissolved carbon dioxide. This increases the concentration so that a supersaturated solution of calcium bicarbonate remains. From this solution, a small amount of calcium carbonate precipitates out. The calcium carbonate formations of dripstone build up over a long period of time, some from the ceiling and some from the droplets which reach the floor.

4—a Batholiths. These massive intrusions may be hundreds of miles long and many miles deep. They may be buried so deep they cool off very slowly, producing coarse-grained igneous rock like granite. In contrast, when *magma* flows onto the surface of the earth, it cools rapidly, forming fine-grained rock like basalt or, sometimes, glassy rock like obsidian if cooling is extremely fast.

In 4—b the laccolith is dome-shaped with a flat bottom and not so massive as the batholith.

In 4—c the dike is a narrow intrusion of *magma* which cuts through a number of different rock layers.

5—b The outer core is liquid, but the inner core is solid. A study of seismic waves set up by earthquakes reveals the nature of and the boundaries of these zones of the earth's interior. The seismic waves include primary waves (longitudinal), secondary waves (transverse) and surface waves (similar to water waves). If the interior were all solid, the P-waves and S-waves would go through the earth and reach the other side. But a shadow zone exists on the side opposite the earthquake where no waves get through. Since the transverse S-waves will not go through liquid, part of the interior must be liquid. P-waves are deflected at a liquid boundary. Further analysis indicates that the inner core with a radius of about 780 miles is solid.

Score yourself: **4—5 right** You've reached the peak!
 2—3 right A down-to-earth score!
 0—1 right You've hit rock bottom!

Science of hierarchiology

(pull is better than push)

The Peter Principle. By Laurence J. Peter and Raymond Hull. William Morrow. (\$4.95).

Some time ago I stopped by a suburban post office at 7:45 a.m. to buy a stamp. A man at the open parcel window said I'd have to wait until eight because that's when the stamp window opened. So, I stared at the sliding Florentine glass panel for 15 minutes. Promptly at eight, it flew up and there was the same man. "Now," he said. "What was it you wann-ed?"

I put it down as a wryly amusing commentary on the state of the civil service mind, and assuaged my frustration by writing up the episode for a humor magazine.

Well, now I know it had nothing to do with civil service. It's much more simple. *That* postal clerk had come up through the ranks of mail carriers (or politics) until his most recent promotion brought him up to *his level of incompetence*. He was exhibiting his "FPS" (Final Placement Syndrome).

That's THE PETER PRINCIPLE. Practically everyone, says Dr. Peter, keeps getting promoted (you have to be competent to get the promotions) until at last he winds up in a job he can't handle competently. That's where he stays, being busily incompetent, until he achieves early retirement, or dies of "peptic ulcer, spastic colitis, hypertension, cardiovascular problems . . . etc." Dr. Peter lists 26 FPS diseases (a through z).

The Peter Principle, of course, accounts for all the incompetents in the

hierarchies of our businesses, industries, and professions, and Dr. Peter makes this delectably clear. A lot of the book deals with "hierarchiology," a fascinating new discipline invented by Dr. Peter. A good hierarchiologist like Dr. Peter can take apart and examine hierarchies piece by piece. And he does. You learn quickly, for instance, that "pull is better than push," that nothing fails like success or succeeds like failure; that those who have finally "succeeded" — by being promoted all the way up to their level of incompetence — are readily recognized by vivid symptoms such as "papyrophobia" (no papers on desk), "papyromania" (lots of papers on desk), rigor caritis (compulsion to make flow charts), "fileophilia" etc.

What do hierarchies do with their no longer useful FPS executives? Well, there's the "lateral arabesque" (self-explanatory) and "percussive sublimation" (kicking them upstairs), to name a couple of things. Basically, says the author, work is done by people who haven't yet reached their level of incompetence. But, of course, in time "every post tends to be occupied by an employee who is incompetent to carry out its duties" (Peter's corollary). In every hierarchy, he points out succinctly, "the cream rises until it sours." It's the nature of our system, so to speak.

What can you and I do to keep our PQ (Peter's Quotient) from hitting zero (incompetence level)? Take courage! Dr. Peter lists a dozen ways — all neatly labelled. There's "Crea-

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tive Incompetence," for instance, wherein you fake it cleverly, thus avoiding the fatal promotion to your FPS. One lad did it by parking his car in the president's slot whenever possible. He's still performing a nice, competent lower echelon job, according to Dr. Peter.

Nicest part of *The Peter Principle* is that it paints such a satisfyingly recognizable picture of those folk in our lives who are stuck plugs in the bung holes of progress. To be sure, Dr. Peter suggests (without being nasty about it) self-examination, but that is easily avoided. Obviously, the author's deliciously broad sweeps of the tongue-in-cheek are meant to plaster well-deserved criticism only on those we deplore. Certainly not us. Right? Right!

It's a very funny book; a highly engrossing study of human character—for all its flippancy—and a volume no one interested in people will put down without finishing in one reading. — RFD

Other new books of interest

Secrets From Ancient Graves. Daniel Cohen. Dodd, Mead & Co. (\$3.95). Rulers and heroes from ancient days such as King Minos and the Mexican god Quetzalcoatl were at one time thought to be legendary figures, but archaeologists found proof of their existence. Other historical characters considered for a time to be almost superhuman have been found to be quite human, also through archaeological discoveries. Mr. Cohen here tells some fascinating stories about some fascinating men and women whose lives have been pieced togeth-

er through years of efforts by numerous archaeologists searching and digging for any clue to these ancient secrets. He has chosen ten individuals, all kings or queens, except for Leif Ericsson, from varying times in history, but all with extremely intriguing lives.

Man: The Next Thirty Years. Henry Still. Hawthorn Books. (\$5.95). Predicting the world of the future has long been a very popular pastime. Here's another author's view on what's to come based on what is happening today. Although done quite seriously, there is some science fiction-type predicting that is fun too.

Your Children's Teeth. Theodore Berland and Dr. Alfred E. Seyler. Meradith Press. (\$6.95). A quite thorough dental guide for parents, this book places a great deal of emphasis on the importance of early dental care (including the mother's prenatal care) for long-term results.

Mind Drugs. Edited by Margaret O. Hyde. McGraw-Hill. (\$4.50). Although this is written primarily for young people who are or will be faced with the question of experimenting with drugs, parents, teachers and religious leaders would do well to read it with careful understanding. Several experts on aspects of mind drugs have contributed chapters to the book.

Cure for Cancer — A National Goal. Solomon Garb. Springer Publishing. (\$4.75). Even though man has been seeking a cure for cancer for a number of years, the goal is still a long way from being attained, and the au-

thor, an M.D. and medical professor, claims that many things which could be done today are not simply because of lack of funds and the inability to interest enough people to get the funds for research. It's a subject of interest to nearly everyone with some enlightening facts on what is being done and what should be done.

The Birds of the Republic of Panama. Part 2. Alexander Wetmore. Smithsonian Institution Press. (\$15.00). An extremely thorough and detailed study by one of the world's leading ornithologists, but a bit too thorough and costly for the average layman.

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Photographs on pages 38 and 39 of Dec. are courtesy of Dr. Jacob Gershon-Cohen and the Archives of Environmental Health. — Ed.

Ten types of doctors that patients deplore

Your recent article, "Ten types of patients that doctors deplore" (December '68) prompts me to point out that there are at least ten types of doctors that patients deplore.

1. The inconsiderate doctor. Makes appointments and keeps a patient waiting for hours in the office. There is no reason he can't schedule his time more accurately, but for reasons of inferiority or ego-building, he gets his kicks out of seeing a full waiting room.

2. The one-up-manship doctor. This one knows it all. He deems himself God's assistant, if not God himself. He rarely calls for consultation or laboratory tests; is uncommunicative and frowns upon questions as a challenge to his authority or knowledge.

3. The overcharger. Rationalizes

his charges by assuming that all patients are rich or have a rich relative from whom they can borrow. If insurance is involved, he raises his fee so that the insurance companies refuse to fully reimburse the patient, who has to make up the balance.

4. V.I.P. doctor. Regards self as privileged. Disregards all traffic rules as something for the common herd. Tolerates no lateness on the part of patients. His time alone is important.

5. Perverse doctor. Gives instructions impossible to follow. Has poor follow-up system and jumps rather than walks to a "cure."

6. The endowed genius. Considers most patients stupid and uneducated. Tells them nothing except in Latin, and that with a supercilious smile which says: "I'll tell you, but of course you can't understand."

7. The invisible doctor. Hasn't seen the patient for months. The nurse, technician or associate does the work. The doctor never sees the results. If he's lucky, the patient may catch "old money bags" on the telephone at the golf club locker room.

8. The "confidence" man. Insists on privacy with any patient—including infants and confused oldsters. A young child needs a parent on hand for "security" and understanding; an old-timer does much better with a son or daughter in the office to interpret the diagnosis and bolster confidence, but this guy prefers keeping his victims in an aura of mystery and fear.

9. The tardy doctor. Comes in late time after time and sometimes fails to show. He always points to an emergency, but refuses to accept a patient's excuse for a similar reason.

10. The "monster" doctor. He is an out-and-out alarmist, pessimistic

and even sadistic in his effort to frighten the patient. He often wants unessential operations.

It is easy to criticize everybody and any situation. In trying to understand, we all recognize the failures and foibles of ourselves and our fellow man. But to be truly helpful, much more can be achieved with kindness. I have the highest respect for my own doctor and I sincerely hope it's reciprocated. What's more, I think he is more typical than atypical. While the types libeled above *do* exist they are more apt to be

found in the overcrowded megalopolises than in the broad reaches of the American "Outback."

JOSEPH HALPERIN
Skokie, Illinois

The cigarette story

The article "What happens when you stop smoking?" in the December '68 issue of *Science Digest* clearly shows the tragedy of cigarettes. I greatly enjoyed reading it.

JEROME BONKOWSKI
Chicago, Illinois

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